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LOGIC WITHOUT TEARS.

FOR

INTERMEDIATE STUDENTS.

Part I: DEDUCTION.

OFFICE OF THE REGISTRAR OF ...
4 OCT 1952

Being expanded lecture notes of an experienced teacher of the subject.

THILLAI & CO.,
Book-Sellers,
Town High School Road,
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TO THE STUDENT

MADRAS

This Guide-book is intended to help you to learn Logic without tears. It seeks to make the subject easy for you. It will help you to follow your lecturer's teaching at College. It will also help you to revise your studies at the time of the examination and to remember efficiently.

There is nothing frightful or difficult about Logic It only tells you what you do in your mind every day. Put the subject matter of Logic as taught to you back in your mind and you will see it is what you have been doing all the time.

Logic is not a subject to be *mugged up*. It is not History where you *mug up* facts and dates. (To do so even in History is wrong). In Logic you deal with arguments or reasoning processes. These must be ***understood***, *not mugged up*

Take the university papers of previous years. Do the exercises and make sure your answers are correct. Your Lecturer will be very glad to help you.

This book is intended to *fix* in your mind what you ***listened to*** in class and ***revised*** at home.

LOGIC WITHOUT TEARS.

I. Definition of Logic.

1. Science of Truth.

2. Science of operations of thought to discover truth.

Science *vs* Popular opinion.

Popular Opinion: often incorrect, incomplete, unsystematic, based on prejudice, hastily formed, not always true and so unacceptable. Cannot constitute knowledge.

Science: Correct, complete, systematic, free from prejudice, based on evidence, verified to be true, accepted and so constitutes knowledge.

Difference between: I *think* Rama is honest and
I *know* Rama is honest.

Think:—It is my personal opinion which may or may not be true (subjective idea)

Know:—It is a fact independent of my thinking. It is true. (objective fact)

Sciences: Knowledge of universe includes a large body of such objective truths. This knowledge divided into sections—Each section deals with one department of universe—Each such section called a Science eg., Physics, Chemistry, Botany, Zoology, Astronomy, Geology etc.

Science— Systematic body of true ideas about a department of universe.

System *vs* Heap.

Heap— Chance collection of many things.
No relation among things.
No limit as to number.
May be added to or taken away from.
No fixity of structure and function of parts.

System — Interrelated whole of definite parts of determinate structure and function—Number of parts definite and limited.

There is an understandable interrelation.

Logic is such a science. Deals with processes or activities of mind which help to discover truth and acquire knowledge. Gives systematic account of these processes. *How is knowledge got?*

3. Sources of Knowledge:

1. Perception (Pratyaksham)
2 Testimony (Sabdam)
3. Reasoning (Anumanam)

Perception may be wrong, illusory. Testimony may be unreliable as person giving it (a) may be ignorant and/or (b) may deceive. So correct reasoning sure source of Knowledge. Reasoning is by thinking.

Thinking is mental activity — an operation of the mind. So Logic deals with the mental operations concerned with the discovery of truth.

II. Nature of Logic.

1. A Subjective Science concerned with mental phenomena and processess.

Sciences

Objective.	Subjective.
Deal with external things outside mind: Physics, Chemistry, Botany etc.	Deal with processes inside mind: Logic, Psychology

2. A Formal Science: (As opposed to Material Sciences.)

Knowledge.

Matter known.	Form of knowing.
What you know—deals with subject matter of knowledge. Botany, Zoology. Astronomy.	How you know it—deals with mental processes involved in the act of knowing and discovering truth.
Plants. Animals. Sun, Moon stars etc.	
Different for different sciences.	Same in all sciences.
Gives rise to different to material Sciences.	To Refers to a Common Formal Science.

Distinction of Form and Matter.

1. Same form but different matter:
   Mud Pot, Silver Pot, Gold Pot.
2. Different forms but same matter:

   Mud Plate, Mud Spoon, Mud Cup.

Form & Matter interdependant:

No formless matter, No immaterial form i.e., There can be no form without matter and no matter without form.

Logic deals with common forms of knowing adopted in the different material sciences. It is the mental common denominator of the several material sciences. It does not concern itself with *what* is known, but asks "*how* it is known". So called ***Science of Sciences*** or ***Scientia Scientiorum*** i. e., Science common to all Sciences—For subject matter of one science may differ from that of another, but mental process involved in all of them concerned with the discovery of truth is same for all.

3. A Normative Science:

   Natural Science vs Normative Science.

Natural Science: Deals with nature of objects—describes how things are and events occur—concerned with what *is*—gives an account of the *actual*, right or wrong, good or bad, perfect or imperfect—Descriptive Science.

Normative Science: Nerm—Ideal or Standard—deals with what ***should be***—considers not what *is*, but what ***ought to be***—what should be the nature of an idea

if it should be true—Does it satisfy the ideal of truth? Is it in keeping with that standard or does it fall below it?—It determines the *value* of a mental process for discovering truth—considers all acts of thinking in relation to the ideal of Truth—Accepts those which satisfy the ideal and rejects those which do not. So Natural Science—Descriptive, deals with what *is*. Normative Science—Evaluative, deals with what ought to be. One deals with structure. The other with function.

Logic, a Normative Science as it considers the value of every thought process from the point of view of the norm or standard or ideal of truth.

Other Normative Sciences—Ethics; Norm: Goodness; Aesthetics: Norm: Beauty.

Logic, Ethics, Aesthetics are 3 Normative Sciences.

All the rest are Natural Sciences.

III. Relation to other Sciences.

1. *Logic* and *Psychology*:

Both concerned with mental processes or operations taking place in mind. So both Mental or Subjective sciences as opposed to Physical or Objective Sciences.

But scope of Logic (a) Narrower (b) Different.

Narrower.

(1) Mental Processes—

Knowing or Cognition (Adj: Cognitive.)
Willing or Conation (Adj: Conative.)
Feeling or Affection (Adj: Affective.)

Psychology deals with all the three. Logic deals only with Cognition or knowing process—Does not care for what we will or desire or how we feel. Our desires and feelings do not affect and must not affect Truth. So Logic has to do only with one aspect of mental life, not with all the three.

(2) Even in cognition: Logic not concerned with all thought processes, but only with those that deal with getting knowledge–Does not study memory, imagination etc.,

(3) Psychology deals with all kinds and stages of mind and its development—Eg.,

(a) Human Mind, Animal Mind.

(b) Child Mind, Boys' Mind, Grown up Men's mind, Old Men's Mind.

(c) Normal Mind and Abnormal Mind.

So different Psychologies i.e., Human Psychology, Animal Psychology, Child psychology, Adolescent Psychology, Normal Psychology, Abnormal Psychology etc.

Logic not concerned with processes in all kinds of minds–deals only with cognitive processes in the mind of a normal adult person who is awake and in full possession of his conscious powers. So its province is limited.

***Difference in point of view*:**

Psychology studies all mental processes, right or wrong, true or false, whether they help to discover truth or no. Wrong thought process equally important

as right one for Psychology—Not so for Logic—Logic studies only those thought processes which will help to discover truth.

Psychology.	Logic.
,	,
Natural Science. mind.	Normative Science of mind
,	,
Descriptive.	Evaluative.
,	,
Deals with Structure (what is)	Deals with function (what ought to be)

But structure and function interdependent. Structure is for a function and function follows from a structure. So Psychology and Logic complementary Sciences.

2. ***Logic and Language.***

Logic — Idea, thought.

Language — Its expression in | Gestures
Words | Spoken
written

Logic — From Greek *Logos* = Thought and Word. An idea and its expression in words interdependent

Unexpressed idea
and words conveying no idea } Both useless.

Language necessary to (a) record (b) remember (c) communicate ideas—Thought lives in language. Words coined for new ideas—Language vehicle or medium of thought.

Precision and clearness of thought means precision and clearness of expression and *vice versa*.

Logic also called grammar of thought.

3. *Logic and Rhetoric.*

Rhetoric deals with forms of forcible expression of ideas to make another believe what is said and assent to it—Intended to persuade irrespective of Truth or Falsehood—Adopts all methods, like style, appeal to feelings, prejudices, pet opinions,—the mechanics of mob-oratory and propagandist writing.

Logic concerned only with Truth–tries to convince with cogent and correct reasons—Does not appeal to feelings etc —Is dispassionate—often called 'cold' Logic as opposed to 'warm' or 'hot' rhetoric—Logic's *reasons* opposed Rhetorical *devices*. Method of Rhetoric different from method of Logic. Rhetoric appeals to heart; Logic appeals to head.

But the two not irreconcilable. Logical arguments can be rhetorically expressed.

4. *Logic—Science or Art or both ?*

Science :– Gives theoretieal knowledge—to *know*

Art :- Gives practical skill—to *do*. Physics, Chemistry, Botany etc.—Sciences. Carpentry, Photography, Cooking, Painting—Arts.

Art based on Sciences eg., Photography on Physics and Chemistry. Medicine on Physics Chemistry, Botany, Physiology etc.

So logic must first be a Science before it can be Art. It is Science for it gives a systematic account of mental processes concerned with discovery of Truth.

Is it also an art ?—Can study of Logic make one expert reasoner as carpentry can make one an expert Carpenter ? No. There is difference between "art" of reasoning and art of carpentery and other arts.

Other Arts. Material: External—Uniform—Permanent—So definite and uniform rules of procedure possible—material generally unchanging—so instruction and practice easy.

Reasoning: Material: Ideas—Internal—Varying—Fleeting, impermanent. So definite, uniform rules of procedure not possible.

What then is use of study of Logic ?

(1) As we study Physiology to know about our bodies, we should study Psychology and Logic to know about mind and its work.

(2) We do not expect Physiology to make us expert in digesting. So why should we expect Logic to make us expert in Reasoning ?

(3) Knowledge is good and valuable for its own sake, not merely for use that can be made of it.

(4) Study of Logic tells how ordered thinking takes place to discover truth which, as intelligent persons, we must understand.

(5) It can tell us what is the nature of Truth. How it is different from falsehood, by what methods Truth is got, ideas are tested, how to avoid falsehood

and also how to detect errors in the reasoning of others and how to avoid those errors in our own reasoning processes.

So though not an Art like carpentry or photography' yet Logic is a Practical Science.

IV. Material of Logic.

Though Logic is a formal Science, it has also a matter or material—This material is ideas or thinking processes which it describes.

How to get this material? Materials of other sciences easily got because they are objective or external, available in the Physical world. But ideas which are material of Logic are mental, inside the mind. How to get this material?

3 ways: (1) Looking at other peoples' face and inferring their ideas. Not always successful. Men may hide their thoughts—Face not always index of mind.

(2) Look into one's own mind—Not easy to study one's thought when one thinks.

(3) Look at the records of thinking left by great discoverers of Science—These records tell us how they thought when they got their discoveries of Truths of Science. Study these records and think as they have described. That will

teach us what thought processes are involved in the discovery of truth. So records left behind by great scientists supply the material of Logic.

V. Parts of reasoning Process.

Logic. Science of Reasoning—Reasoning = Process of obtaining a new idea from a given Idea or ideas. Given idea is basis or ground of reasoning. Idea obtained is called conclusion. Whole process called Inference. In reasoning, an inference is made.

All men are mortal beings.

Rama is a man

∴ Rama is a mortal being.

This is an inference. First two statements are reasons for inference. They are called Premises. The last statement is called Conclusion.

In Logic each statement is called Proposition. Proposition means a Judgment expressed in words. Judgment is unit of thought. Unit of thought means the most simple or elemetary process of thought i. e., A single or unitary idea which conveys a complete meaning to the mind. Eg, 'Rama is honest'. 'That is a mango tree'. If you say " Rama "—Q: What about Rama ?—Idea not complete. If you say Rama is honest. Rama is coming. Rama is dead. Then idea is complete. A complete idea is Judgment,

Judgment expressed in words is Proposition. In every judgment or proposition something is stated about something else. ***Being honest*** is stated about ***Rama***. This stating or statement is called Predication.

To state is to *predicate*. ***Being honest*** is predicated of ***Rama***.

A predication has two parts :

(1) That about which the predication or statement is made. Here ***Rama***. It is called the ***subject*** of predication.

(2) The predication or statement itself. Here ***being honest***. It is called the Predicate of Predication.

So every predication in a proposition has 2 parts. The Subject and Predicate of a proposition are called the Terms of a proposition. They are called the Subject Term and the Predicate Term.

Note: A predicate in Logic is different from a predicate in grammar. Grammatical Predicate is a verb. But a Logical predicate is an idea stated about something else. It is generally a noun or a word or group of words having the sense of a noun.

So a proposition which is a logical statement has 2 terms: Subject Term and Predicate Term.

VI. Terms.

Term == A word or group words capable of standing as Subject or Predicate of a Proposition.

Words

Categorematic	Syncategorematic
Can be a Term.	Cannot be a Term.
Eg., Man, Hill, Waterfall below the bridge. Dinner of last night etc.	Eg., Ah, Oh! Alas! But, etc.,

Words

Univocal.	Equivocal.
Having one meaning only	Having two meanings.
River, Sky, Boy.	Pen = Writing instrument. Pen = Place where pigs are kept.

VII. Names.

1. Singular, General Collective.

Singular Name (Word or group of words)

A name that applies to only one object.

Eg., The highest mountain in the world.

The pen that I bought yesterday.

The Maharaja of Mysore.

The President of the Indian Republic.

All Proper Names are Singular Names, for they refer to one person or object or place only. King George VI, The Himalayas, Madras.

General Name: A Name that can apply in the same sense to *each* of many persons, places or things. Eg., Man, City, Tree.

Man applies to *each of many men*.

City applies to *each of many cities*.

Tree applies to *each of many trees*.

Collective Name: A name that applies to many objects *when taken together*. Eg., Crowd, Regiment, Class, Family.

Name.

Singular.	General.	Collective.
Applies to one object only.	Applies to *many objects*, to each of them separately.	Applies to *many objects*, to all of them together.
one.	many separate.	many together.

A Singular name man become general.

Eg., Gandhi (Singular)	A Gandhi or Gandhis (General)
Refers to a definite person.	Refers to any one or to all who have qualities of Gandhi.

This is called *generalising* of a Proper Name.

A Name general in one sense may be collective in another sense :

Regiment Collection of Soldiers.
| |
Collective.   General.

Army Collection of Regiments.
| |
Collective.   General.

Regiment is collective name with reference to Soldier. But it becomes general name with reference to Army.

2. *Abstract and Concrete Names.*

Concrete Name refers to an object that can be perceived by the senses. Eg., Man, Orange, Mountain.

Abstract Name refers to an object that cannot be perceived by the senses, Eg., goodness, whiteness, mercy, ignorance.

Names of qualities are Abstract Names.

Names of objects are Concrete Names.

Note :- Do not Say: Concrete Name is a name that can be perceived by the senses. This is wrong. You must Say: " A concrete name ***refers to an object*** that can be perceived " Similarly, An Abstract name ***refers to an object*** that cannot be perceived. '***Refers to an object***' is important.

3. *Absolute and Relative Names.*

A Name which refers to an object whose meaning can be understood by itself without reference to another object is an Absolute Name.

A relative name referes to an object which can be understood only in relation to another object.

Egs.	Absolute Name:	Tree,	Hill,	River.
	Relative Name:	Father,	King,	Master.
	Relative to	Child	Subject	Servant.

Relative names always go in pairs. They are called *Correlatives*.

Eg., Father & Child.
Teacher & Pupil.
Husband & Wife.

4. Positive and Negative Names:

Positive Names indicate presence or possession of a quality Eg., Rich, Clever, Strong, Lighted, Valuable indicating respectively possession of qualities of riches, cleverness, strength light, value.

Negative Names indicate absence of a quality Eg., Poor, Stupid, Weak, Dark, Valueless.

Positive Names and Negative Names are opposites of each other.

This opposition is of 2 kinds.

Contrary Opposition.	Contradictory Opposition.
Middle ground possible between the opposites. Eg., Opposites: Hot x Cold (Middle Ground Warm.)	No middle ground possible Complete opposition. Eg., Hot — Not Hot Clever — Not Clever.

Contradictory of a Name usually obtained by prefixing (putting before) NOT or NON to the Positive name. Eg., Hot: contradictory: Not—Hot; Light: contradictory: Not-Light; Rich and Not-Rich; Co-operation and Non-Co-operation.

5 *Privative Name:*

A Name that indicates deprivation of a quality usually possessed by an object. Eg., Dumb, Lame, Deaf etc.

6. Connotative and Non-Connotative Names:

Possesses both Connotation and Denotation.	Possesses only connotation or Denotation; not both.

Note:— A name that has connotation only is non—connotative like a name which has denotation only.

A Denotation and Connotation.

Two functions of a Name

To point out or denote an object.	To refer to or indicate or connote qualities of an object.
Eg., Chair—This chair, That chair, The other chair, applies to all articles which are chairs Application, Extension, Denotation. objects.	Eg., Chair—implies an article of furniture with 4 legs, a seat and a back. Implication, Intension, connotation. Qualities or Attributes.

B ***Three meanings of Connotation.***

1 All qualities of an object–known and unknown.

2. Only known qualities of an object.

3. Those qualities of an object on account of which the name is given to it.

Criticism of the above:—

1. If connotation includes known and unknown qualities, unknown qualities are meaningless; for it is not possible to understand the *unknown* qualities.

2. If it applies only to *known* qualities, known qualities for one person will differ from those for another. There will be no uniformity in connotation. As knowledge of an object increases, known qualities will increase and get modified. There will be no fixity in connotation.

3. The last view is the best. Connotation—those qualities on account of which the name is given to an object and but for which the name will not be given to it.

C ***Relation between Denotation and Connotation.***

Denotation — Objects denoted by a name.

Connotation — Qualities or attributes connoted by it.

Ship means a sailing vessel. Being a sailing vessel is its quality or connotation. The name applies to all sailing vessels in the world, past, present and future.

Add an attribute to it "Steam"—The name now becomes Steam ship. By this the connotation of the name has increased. But the name now applies to less objects than before; for the number of steam-ships is less than the number of ships in general. So with the increase of connotation, the denotation of the name has decreased Again add a quality 'British'. The name becomes "British Steam-ship". They are less in number than 'Steam-ships' of the world. So connotation has increased, but denotation has decreased. Again add 'military'. The name becomes "British Military Steam-ship". Its denotation is less again than of "British Steam ship". So as connotation increases, denotation decreases.

Connotation least
Denotation most

Ship
|
Steam-Ship
|
British Steam-Ship
|
British Military Steam-ship
|
British Military Steam-ship that was sunk near Singapore.

Denotation least
Connotation most

Also as Denotation increases, connotation decreases. Take away quality after quality, the name applies to more objects i. e., If you decrease the connotation, the denotation increases.

D This relation stated in another way i. e., ***There is an inverse ratio between Connotation and Denotation.***

But this theory of *Inverse Ratio* in the relation of Connotation and Denotation is ***wrong.*** For:

1. Objects can be counted as one, two, three etc. But qualities cannot be counted. What is taken by one man as *one* quality may be taken by another as many qualities e. g., Beauty or personality.

2. There is no exact mathematical ratio between the variations of connotation and Denotation.

Eg. Europeans.

A. Swiss Europeans. B. Russian Europeans.

In A and B connotation has increased only by the addition of one quality, but the decrease in denotation is greater in A than in B.

3. Sometimes denotation increases without connotation decreasing: Eg. Increase of population (which means increase of Denotation of man) does not cause decrease in his qualities i. e., in his connotation.

4. Sometimes denotation decreases without connotation increasing: Eg. Many people die on a war or famine i. e., Denotation of Man decreases; but there is no corresponding increase in his connotation. No new quality is added to him.

5. Sometimes connotation increases, but there is no decrease in denotation. Eg. civilised man has more qualities i. e., more connotation than ancient primitive man. But on that account the number of men (denotation of man) has not decreased.

So there is no exact mathematical ratio between the changes of connotation and denotation. The theory of inverse ratio is wrong.

We can only say: As connotation or denotation increases, denotation or connotation *tends* to decrease. Even this relation is true only in respect of things that can be arranged in a series of higher and lower classes i. e., in a classificatory series.

So every name has 2 aspects, a Denotative aspect and a Connotative aspect.

E Mill's View.

Name

- Connotative Name
  - Has both connotation and denotation.
- Non-Connotative Name
  - Has connotation only *or* has denotation only.

Non-Connatative Names

- Proper Name
  - Has Denotation only No connotation.
- Abstract Name
  - Has connotation only No denotation.

Mill Said: Proper Names are Non-connotative i. e., They have only denotation, but no connotation.

(i) Mill's reasons for this view:

1. Purpose of a Proper Name is to denote a single object. It is only an identifying mark—like a dobhy's mark on cloth—Nothing special about the name —Instead of this, any other name might have been

given—Proper name only an accident—Not given for a reason.

2. Even if given for a reason like, say, Kaveripoompattinam, continuance of the name independent of the reason. If the river changes its course and enters the sea elsewhere the original place is still called Kaveripoompattinam. So according to Mill, the purpose of a proper name is only to denote an object (or person or place) but not to refer to qualities at all. So, it is non-connotative.

Criticism of Mill's view

1. It is true that the purpose of a proper name is to signify an object or person. But the name also indicates the qualities of the bearer of the name.

2. Sometimes names are given for a reason. eg., New York, New Delhi, Buddha, Sitaram etc. The names emphasise the connotative aspect in addition to the denotative aspect.

3. Very often names indicate nationality, sex, religion, etc., Abdul Rahim, Mrs. Renuka Devi, Winston Churchill, Ramaswamy etc.

4. Generalising of proper names draws attention to their connotative aspect.

Eg., A Gandhi, A Hitler or Gandhis or Hitlers. Here reference is to qualities of Gandhi or Hitler, not to the persons signified.

So proper names have connotation also. They have denotation primarily and connotation secondarily. It is wrong to say that they are Non-Connotation.

(ii) Mill said: Abstract Names are non-connotative i. e., according to him they have connotation only, but no denotation. When you say Ignorance, you cannot point out to or denote it. You can only speak of the quality. 'Ignorance' cannot be ***denoted.*** It can only be ***connoted.***

Criticism**:**

It is true that the main purpose of an Abstract Name is to refer to qualities So it has connotation. Sometimes we say "This ignorance" referring to an instance of ignorance. That is the denotative aspect of an abstract name.

So, an abstract name has connotation primarily and denotation secondarily. Wrong to say that it is non-connotation.

Hence, all names have both denotations and connotation. There are no non-connotative names. All names are connotative names. Mill's theory of Non-connotative names is wrong.

VIII. The Prediеables.

Objects arranged in groups or classes, a larger group including a number of subordinate groups or parts.

Genus**:** A big group having a number of parts under it.

Species**:** Each part into which a genus is sub-divided.

Differentium**:** Essential quality of difference between the several species.

Proprium **:** A quality derived from the differentium.

Accidens **:** An unessential quality of an object.

Accidens

- Separable Accidens
  - Can be separated from the object.
- Inseparable accidens
  - Cannot be so separated.

Examples.

Men (Genus)

- (Species) – Asiatics.
- Europeans (Genus)
  - (Species) – Frenchmen
  - Germans
  - Italians
  - Englishmen (Genus)
    - (Species) – Protestants (Genus)
      - (Species) – Londoners (Genus)
        - (Species) – Living in Buckingham Palace (Genus)
          - (Species) – The King.
          - Others.
        - in other places of London
      - Others
    - Catholics
  - etc. etc.,
- Africans
- Americans
- Australians

Men — Highest Genus or Summum Genus.
The King — Last species or Infima species.
Asiatics, Europeans etc. — *Species* of Genus.
Continent inhabited by them is *Differentium*.

Living in Eastern or Western Hemisphere is proprium. i. e., quality following from a differentium.

Wearing a hat — *Separable Accident*.

Having white skin or brown skin or black skin — Inseparable accident.

Summum Genus — Cannot be the species of a higher genus. It is the highest genus.

Infima Species — Cannot be further divided into other species. It is last species.

Genus = all its species put together. The species together make up the Genus. They exhaust the Genus. Each Species expresses the nature of the Genus.

Triangle — Genus.
Equilaterial, Isosceles, Scalene — Species
Equality of sides — Differentium.
Equality of angles — Proprium.

Objects which cannot be classified as Genus or Species are called *Sui Generis* i. e., such an object is a Genus independently eg., God.

IX. Fixing the Meaning of Terms.

(i) Reasoning employs language as its instrument. Language is made up of words. For proper reasoning,

words must convey clear, correct and only one meaning. If the two parties in a discussion attach different meanings to the words that they use, they cannot understand each other and reasoning cannot go on. So it is necessary to fix the meaning of words before beginning any discussion.

(*ii*) *Meaning of a word may be fixed.*

From the point of view of its connotation	From the point of view of its denotation
Definition.	Division.

To define = to give the exact meaning of a name in clear and concise language referring to its connotation.

(*iii*) *Definition is different from Description.*

Description	Definition
1. Includes many details which are not necessary.	1. Gives only necessary ideas to make the meaning clear.
2. Employs many words. Is usually long.	2. Employs as few words as possible. Is concise.
3. Language rhetorical.	3. Language simple
4. Popular.	4. Scientific and technical.

(iv) *Rules of a Logical Definition.*

1. A Logical Definition should be given *per genus et differentium.*

2. It should not contain the name to be defined or any word synonymous with it.

3 It should be neither broad nor narrow. The definition should be exactly equivalent to the name defined.

4. It should not be given in obscure, difficult or figurative language.

5. As far as possible, it should be affirmative rather than negative.

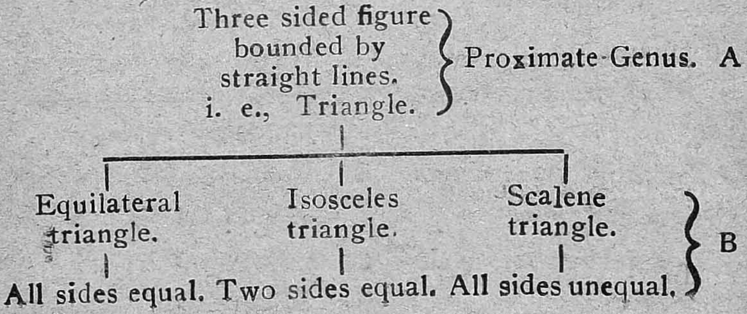
(v) *Explanation of Rules :*

1. Per Genus et differentium—By the genus and differentium. A definition should give (1) *the next higher* genus of the name to be defined and (2) the essential basis of difference i. e., differentium between it and its other co-ordinate species.

eg., An equilateral triangle is a three sided figure bounded by straight lines which are all equal.

Here *Equilateral triangle* is name to be defined.

A three sided figure bounded by straight lines which are all equal—is the definition.

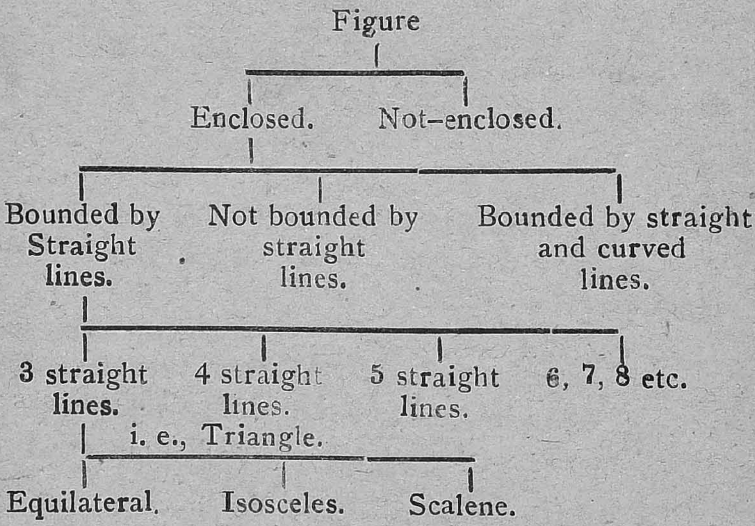


Equality of sides : Differentium.

Logical definition must give A and B. A being proximate genus and B being differendium.

Proximate Genus = Next higher genus.

Distant or remote genus should not be given. **Eg.**, An equilateral triangle is a "Figure having its **sides** equal" will be wrong.



So *figure* is remote genus of **Equilateral triangle.** Its proximate genus is ***triangle*** i. e., ***three-straight-line-enclosed figure***.

2. Definition should not contain name **to be** defined or words having same meaning. Such a **defini**-tion will not ***explain*** the name.

Eg., Man is *a human being is* a wrong definition. Human is synonym of *man*. It repeats the word to be defined.

3. A definition should not be (a) broad and (b) narrow.

(a) A broad definition applies *also* to objects to which the definition should not apply.

Eg, A cow is *a horned animal*. *Horned animal* applies to cows, bulls, stags, goats etc.

It *includes* more objects than are denoted by the name to be defined. So, it is *broad*.

(b) A narrow definition does not apply to some objects to which the definition should apply. Eg., A lawyer is a man who practises in the Madras High Court. Does not apply to lawyers who practise in other courts.

It *excludes* some objects denoted by the name to be defined. So it is *narrow*. The denotation of the name to be defined and the denotation of the definition should be indentically equal, i. e., neither more nor less.

4. A definition should not be stated in difficult, obscure or figurative language. Purpose of definition is to make the meaning of the word clear. Difficult, obscure and figurative language will not make the meaning clear. It will not achieve the purpose of definition.

Examples of such wrong definition:

Net is a reticulated fabric with innumerable interstices.

Architecture is music in stone.

Tax is a levy.

5. A definition should be stated as far as possible affirmatively rather than negatively. It must explain what the word means (affirmative) and not what it does not mean (negative). But where an affirmative definition is not possible a negative definition can be given. Eg. Bachelor is an *un*married male.

(vi) *Limits of Logical definition.*

No logical definition can be given of certain kinds of words. They are :

1. The Summum Genus: For, it has not proximate genus.

2. The Infima Species: For it has no differentium as it has no co-ordinate species.

3. Sui Geneus Terms: They have neither Genus nor differentium.

(vii) *Other kinds of Definition.*

1. Verbal Definition — Gives only dictionary meaning. Does not explain clearly and precisely.

2. Genetic Definition — Explains the word with reference to the origin of the object it denotes.

Genesis = Origin. Genetic is adjective of Genesis. Eg. Water is made up of two parts of hydrogen and one part of oxygen.

(*viii*) *Division.*

(Fixes meaning of words by referring to their denotation)

(Genus divided into its species)

Logical division | Dichotomic division
Many species, all affirmative. | Only 2 species, one affirmative, the other negative.

To Dichotomise=to cut into two

Dichotomic — Two-fold.

(*a*) ***Example of Logical division.***

Men of the World

Hindus. Christians. Mussalmans. Parsis. Budhists. etc

Books in a Library

English Books | Tamil Books | Telugu Books | Sanskrit Books | Hindi Books | etc.

Colleges

Arts Colleges. | Professional Colleges. | Colleges of General Culture.

(*b*) ***Rules of Logical Division.***

1. Every division should be based on a fundamental principle of difference among the species. This principle is called ***Fundamentum divisionis.***

Division.	*Fundamentum Divisionis.*
Men into Hindus, Mussalmans, Christians etc.	Religion professed.
Men into Asiatics, Europeans, Africans, Australians, Americans etc.	Continent inhabited.
Books into English, Tamil, Telugu, Sanskrit, Hindi etc.	Language in which written.

2. There should be *only one* fundamentum divisionis throughout the division, not two or more. If there is more than one fundamentum division, it will be wrong division.

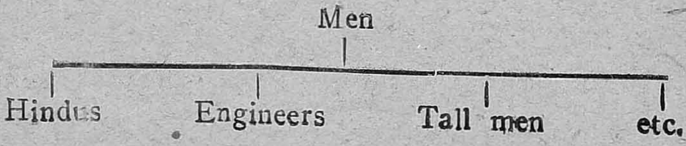
Example. Men into Asiatics Europeans, Christians, Whites, Engineers.

Here there are 4 fundamenta divisiones i. e., continent inhabited, religion professed, colour of skin, profession adopted. This is wrong division.

3. The species of the division (i. e., *Dividentia Membra*) should be (a) mutually exclusive (b) collectively exhaustive.

(a) Each species should exclude all other coordinate species. If it includes any of them, the species are said to *overlap*.

Example:



Here some Hindus may be Engineers also. Some Engineers may be tall men also. The species include each other. They are not *mutually exclusive*.

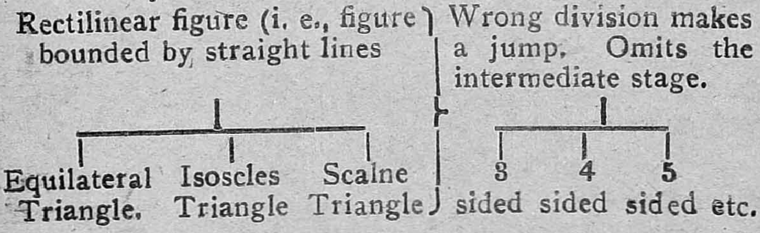
(b) All the species put together must make up the Genus. No part of the Genus should be left over not mentioned in the species.

This division is incomplete.

Asiatics plus Europeans plus Americans is not equal to all Men. Australians and Africans have been omitted from the species. The species here are not collectively exhaustive.

4. A division should proceed step by step. It must not make a jump.

Divisio non faciat saltum.



Dichotomic Division.

based on Law of Excluded Middle. Law of Excluded Middle is one of Laws of Thought.

Laws of Thought:

Regulative Principles of Reasoning. Laws or Rules according to which all correct reasoning should take place. Violation of the laws will lead to wrong reasoning. These laws regulate or govern the process of ordered reasoning.

Laws of thought

Laws of Identity.	Law of Non-contradiction	Law of Excluded Middle.	Law of Sufficient Reason.
A is A.	*A is not not-A.*	*A is either B or not-B.*	
Everything remains identical with itself.	Nothing passes into its opposite or contradictory.	It cannot be both. There is no middle ground between contradictories. A thing is either the one or the other of two contradictories.	For every statement there must be a sufficient reason to support it. For every event there must be a sufficient reason to explain it.
Not bare identity (or tautology) But identity in difference; in spite of differences.			

Further explanation of Laws of Thought.

With reference to (a) Words.

(b) Objects and events.

1. Law of Identity	(a)	Every word has a fixed or identical meaning throughout a discourse.
	(b)	Every object has a fixed or identical nature.
2. Law of Non-contradiction.	(a)	The meaning of a word does not become its opposite.
	(b)	An object will not become different from itself.

Law of Non-Contradiction states negatively what Law of Identity stated affirmatively.

3. Law of Excluded Middle.	(a) & (b)	A thing is either A or B, not both.
	1.	If it is A, it is not B.
	2.	If it is not A, it is B.
	3.	If it is B, it is not A.
	4.	If it is not B, it is A.

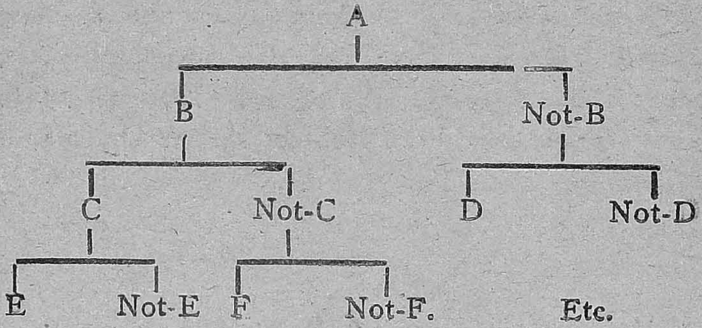
A man is either alive or dead, not both.

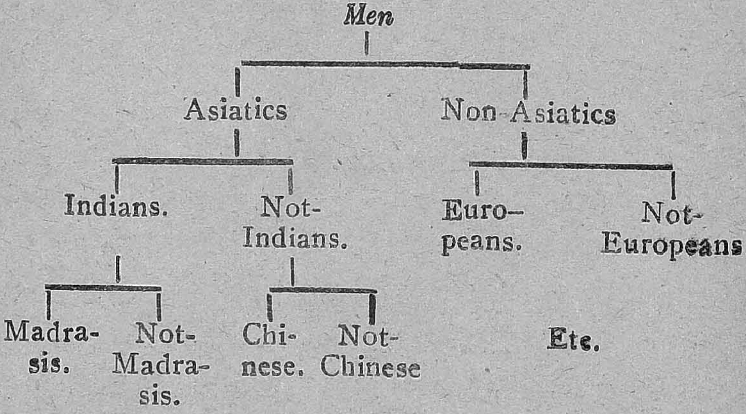
If he is alive, he is not dead
If he is not alive, he is dead
If he is dead, he is not alive
If he is not dead, he is alive

There is no middle ground between contradictory words or opposite ideas.

Division by Dichotomy.

Example.





Each Genus divided into 2 species, one positive and the other negative.

Positive species expresses the presence of a quality.

Negative species expresses the absence of that quality.

Only two species in each stage of division. The two specias are contradictories of each other. There is no middle ground between them. i. e., Division is based on Law of Excluded Middle.

Negative species not to be understood ***absolutely*** but with reference to the Genus divided i.e., with reference to the *Universe of discourse*. Universe of discourse means totality of subject matter about which we speak.

Example.

Furniture.

Chair. Not-Chair.

Not-Chair means not anything which is not chair. i. e., tree, mountain or book, but it means ***articles of furniture which are not chairs***. Here ***articles of furniture*** is the ***universe of discourse*** within which ***not-chair*** is to be understood.

Division.

By Dichotomy.	Logical Division.
1. Only 2 members. one Positive, the other Negative.	1. 2 or more members, as many as needed to make species collectively exhaustive.
2. Negative member not very enlightening.	2. Species clearly describe the Genus.
3. Often adopted for rough distinctions.	3. More scientific and gives full knowledge.

Cross Division.

A *wrong* kind of Logical division in which more than one fundamentum divisionis are adopted. Leads to overlapping of species.

Men

Hindus. Christians. | Engineers. Painters. | Africans. | Whites.

(1) | (2) | (3) | (4)

There are 4 ***fundamenta divisiones*** in the single division.

They are (1) Religion (2) Profession (3) Continent inhabited (4) Colour of the skin 'This is wrong'.

Co-Division.

Different alternative forms of ***right division.*** In each separate division, a different fundamentum divisionis is adopted.

Example:

Men

Asiatics. Africans. American. Australians. European.

Fundamentum Divisionis (Continent inhabited)

Men

Whites. Blacks. Browns. Yellows.

2 (Colour f skin)

Men — 8 (religion of professed)

Hindus. Christian. Mussalmans. Parsis. Budhists.

Co-division is right.

Cross division is wrong.

Other kinds of Division.

Artificial Division.

Based not on essential quality, but on accidental quality. Eg. Division of Books in a library according to the colour of their binding or the alphabetical order of the names of their authors.

Physical Division.

Division of a thing into its physical parts. Eg.

Man

Head. Trunk. Limbs.

Tree

Root. Stem. Branches. Leaves.

Metaphysical Division.

Division of a complex idea in to its component elementary ideas Eg.

Beauty.

Figures. Proportion. Colour. Ornaments. etc.,

As Connotation and Denotation are interrelated aspects of a Name, so Definition based on Connotation and Division based on Denotation are interrelated aspects of fixing the meaning of a word.

Propositions.

In a Proposition, a statement is made i. e. a fact is stated. The statement is called a *Predication* in Logic. To make a statement is to make a *predication*. To state = to predicate.

I. Proposition or Statement or Predication.

2 Parts.

that about which the statement or predication is made.	the statement or predication that is made.
called *Subject* of the Preposition.	called *Predicate* of the Proposition.
Symbol S.	Symbol P.

II. Predication may be made

Affirmatively.	Negatively.
It is then called *affirmative* predication. The proposition is called *Affirmative Proposition*.	It is then called *negative* predication. The Proposition is called *Negative Proposition*.

III. Predication may be made

Of the whole of the denotation of the subject i. e. of *all* objects or persons denoted by it. Then it is called *Universal* predication. The Proposition is called *Universal Proposition*.	Of only a part or portion of the denotation of the subject i.e. only of *some* objects of persons denoted by it. Then it is called *Particular* predication. The proposition is called *Particular Proposition*.

In the above

Affirmative and Negative.	}	refer to ***Quality*** of a Proposition
Universal and Particular.	}	refer to ***Quantity*** of a Proposition.

Eg. Men ***are*** mortal : Affirmative }
Men ***are not*** mortal : Negative } Quality.

All men are mortal : Universal }
Some men are mortal : Particular } Quantity.

Men ... ... Subject (Symbol S)

Mortal ... Predicate (Symbol P)

The grammatical predicate "are" or "are not" is the connecting link between the subject and the Predicate of the Proposition. It will be "is" or "is not" if the subject is in the singular number. This connecting link is called *Copula*.

In every Proposition there are:-

1. The Subject ... ... that about which the statement is made.

2. The Predicate ... ... the statement that is made.

3. The Copula ... connecting the subject and the predicate.

4. The Copula is of the form *is* or *are* shows it is an *affirmative* predication.

5. The Copula is of the form ***is not*** or ***are not*** shows it is a ***negative*** predication. So Copula gives sign of ***quality*** of the proposition.

6. The word ***All*** at the beginning of a Proposition shows that the predication is made of the ***whole*** of the denotation of the subject i. e., that the Proposition is *Universal*.

7. The word **Some** at the beginning of a proposition shows that the predication is made of only a ***part*** of the denotation of the subject i. e., that the Proposition is ***Particular***.

So in every Proposition there are:

- Subject — S.
- Predicate. — P
- sign of quality. — *is* or *are* (affirmative); ***is not*** or ***are not*** (negative)
- sign of quantity. — ***All*** or **some.**
  - ***All*** — (universal)
  - **some** — (particular)

Propositions.

- Quantity
  - Universal.
  - Particular.
- Quality
  - Affirmative.
  - **Negative.**

So 4 combinations of Quantity and Quality.

1. Universal Affirmative.
2. Universal Negative.
3. Particular Affirmative.
4. Particular Negative.

Latin word for Affirming is *Affirmo*
Latin word for denying is *Nego*.

A and *I* are first two vowels in Affirmo.
E and *O* are two vowels in Nego.

These letters are symbols for different kinds of predication as follows:-

A and I for affirmative predication.

A=Universal affirmative.
I=Particular affirmative.

E and O for negative predication.
E=Universal negative.
O=Particular negative.

Combining these symbols with symbols S and P for subject and predicate, we get the following symbols for the four kinds of propositions.

S a P ... ... Universal affirmative proposi ion.
S e P ... ... Universal negative proposition.
S i P ... ... Particular affirmative proposition.
S o P ... ... Particular negative proposition.

1.	Universal Affirmative.	All S is P / S a P	All | men | are | rich per- [sons.
2.	Universal Negative	No S is P / S e P	No | men | are | rich per- [sons.
3.	Particular Affrmative.	Some S is P / S i P	Some | men | are | rich [persons.
4.	Particular Negative	Some S is not P / S o P	Some | men | are not | rich persons.

A logical Proposition should give:

1. Sign of quantity | 2. Subject | 3. Copula (Sign of quality | 4. Predicate.

For universal affirmative 1 and 3 will be *All* & *are*.

For Particular affirmative 1 and 3 will be *Some* & *are*.

For particular negative 1 and 3 will be *Some* & *are not*.

But for universal negative 1 and 3 will be No are.

You must not say: *All men are not rich persons*.

But you must say *No* men *are* rich persons,

This must be carefully noted and remembered.

Ordinarily statements of discourse are not given in strict logical form. For logic, they must be expressed in the form of a logical proposition. This is called *putting statements in logical form*. To do this when a statement is made, ask yourself the following questions in the order specified:—

1. About what is the statement made?

2. What is the statement that is made?

3. Is the statement made affirmatively or negatively?

4. Is the statement made of the whole of the denotation of the subject or of only of a part of the denotation of the subject?

Answer to 1st question will give Subject of the proposition.

Answer to 2nd question will give Predicate of the Proposition.

Answer to 3rd question will give Quality of the Proposition.

Answer to 4th question will give Quantity of the Proposition.

Write down these answers in that order and you will get the statement expressed in logical form.

Eg. Statement: English Kings are Protestants.

Answer to 1st Question:	English Kings
Answer to 2nd Question:	Protestants
Answer to 3rd Question:	affirmative; so *are*
Answer to 4th Question:	of the whole of the denotation of the subject, i. e, statement is made of *all* Kings. — So *All*

You will write them one after another as follows:

```
    | English Kings |     |
          1
    | English Kings |     | Protestants
          1                    2
    | English Kings | are | Protestants
          1            3       2
All | English Kings | are | Protestants.
 4        1            3       2
```

So logical form develops as follows:

All	English Kings	Are	Protestants
4	1	3	2

The numbers indicate the order in which the words are witten in answer to the above 4 questions.

Write the answers to the 4 questions as above in that order. Draw vertical lines after the sign of quantity, after the subject and after the copula to clearly mark off the 4 parts of proposition.

S a P...*All* | English Kings | *are* | Protestants |
S i P *Some* | English Kings | *are* | Protestants |
S o P *Some* | English Kings | *are not* | Protestants |

S e P *No* English Kings *are* Protestants.

Note: For S e P *you must not write:*

All | English kings | *are not* | Protestants |

This form is wrong. You must write as follows only:-

No | English Kings | *are* | protestants |

Connect *No* and *are* by an arrow to show that *No* belongs to the copula *are* and that the proposition is *negative* and universal. So remember that a Universal negative proposition always begings with *No*. In the place for the copula write *are*.

Other rules for putting statements in logical form:—

All are, Each is, Every is—*A* Proposition

None is, Few are, No one is, Rarely any—
E Proposition

A few are, Many are, Most are,
A large number are, some are } —*I* Proposition

Some are not, Many are not, Most are not,
A alrge number are not. A few are not,
All are not, Each is not, Every is not, } —*O* Proposition

Note—A few = *I* or *O*. Few = *E*

Only, None but, Alone—These are Exclusive or Exceptive Statements. They must be stated as *E* Proposition.

Only graduates can vote. L. F. ie. Logical Form is:

No | Non-graduates | are | persons who can vote
S e P

Not All graduates can vote ... ... This is wrong.

The purpose of "Only, Alone, None but" is to exclude others than graduates and to say that they cannot vote.

"None but the brave deserve the fair"

L. F. is No | non-brave persons | are | persons who deserve the fair
S e P

So begin with "No non—" when you get such *exceptive or exclusive statements*.

Certain statements are called *Indesignate*. Indesignate is opposite of designate. To designate = To

signify or point out. So Indesignate = What does not point out clearly if the subject is taken in its entire denotation or only in part of it.

Sikhs are brave persons. It is not clear if the statement refers to all Sikhs or to some Sikhs only. So, the statement is called Indesignate statement. Its logical form is *I*. It must be written as

Some | Sikhs | are | brave persons
S i P.

Similarly

South Indians are musical

L. F. is Some | South Indians | are | musical persons.
S i P.

Singular propositions are to be treated as Universal.

Sri Rama was Prince of Ayodhya
Dr. Rajendra Prasad is President of Indian Union
The highest peak in the Himalayas is Mount Everest
These are all S a P

Sometimes the statement is a complex sentence with a clause qualifying the subject. The clause may come at the end of the sentence. It must be attached to the subject.

Every one will be admitted who has brought a ticket

Answers to the 4 questions.

1. Persons who have brought a ticket.
2. Persons who will be admitted.
3. Are.
4. All.

All	persons who have brought a ticket.	are	persons who will be admitted.
	S	a	P.

All are not brave who say they are.

Answers to the 4 questions.

1. Persons who say they are brave.
2. Persons who are brave.
3. Are not.
4. Some.

Some	persons who say they are brave	are not	persons who are brave
	S	o	P

Four Views of Predication.

All men are mortal beings.

1. Class view or denotative view. Both Subject and Predicate understood in denotation. i. e., as belonging to a class or group.

The class of men belongs to the class of mortal beings.

2. Predicative view: Subject in denotation predicate in connotation.

All men possess the quality of mortality.

3. Connotative view: Both subject and predicate in connotation.

The quality of humanity is always associated with the quality of mortality.

4. Connotative—Denotative view. Subject in connotation and predicate in denotation.

Humanity is an attribute of some mortal beings

Estimate of the views.

4th view: Unnatural

3rd view: Abstract

2nd view: Scientific and descriptive

1st view: Adopted in classification and division.

Euler's scheme of representing propositions.

S a P. All | men | are | mortal beings.

S e P. *No* | men | *are* | mortal beings.

S i P. Some | men | are | mortal beings.

S o P. Some | men | are not | mortal beings.

S a P. Circle of men inside the circle of mortal beings.

S e P. The two circles are outside each other.

S i P. The two circles intersect. The common portion is referred to.

S o P. The two circles intersect. That portion of circle of men which is outside circle of mortal beings referred to.

Note: For S a P in the case of a *Singular* proposition like *Pandit Nehru is our Prime Minister*, the two circles will coincide.

Distribution of Terms in propositions.

A term is said to be distributed if the reference is to its *entire denotation* i. e., if *all* persons or objects denoted by it are included in the statement, if the predication is made of *all* of them.

All men are mortal beings.

=*All* | men | are | *some* | mortal beings.
s a p

Here reference is to the entire denotation of men which is the subject–see ***All men***. But only a part of the denotation of mortal beings which is predicate is referred to–see *some mortal beings*.

So here Men (subject) is said to be distributed.

Mortal beings (predicate) is not said to be distributed. Similarly,

No | men | *are* | mortal beings.
s e p

i. e, *No* | men | *are* | any | mortal beings.

All men are denoted and all mortal beings also are denoted. So both subject and predicate are distributed.

Some | men | are | mortal beings

=Some | men | are | some | mortal beings.
s i p

Some men alone are denoted – not all.

Some mortal beings alone are denoted – not all.

So neither subject nor predicate is distributed.

Some men are not mortal beings.

=Some | men | are not | any mortal beings.
s o p

Some men are denoted – not all.

All mortal beings are denoted.

So subject is not distributed But predicate is distributed. Putting these together, we get the following scheme of distributions,

Proposition.	if subject distributed.	if predicate distributed.
A	Yes	No
E	Yes	Yes
I	No	No
O	No	Yes

Universal Proposition – Subject distributed
Particular Proposition – Subject not distributed
Affirmative Proposition – Predicate not distributed
Negative Proposition – Predicate distributed

Subect alone distributed.	Predicate not distributed	— A Proposition.

Both subject and predicate distributed = *E* Proposition

Neither subject nor predicate distributed = *I* Proposition

Subject distributed but not Predicate = *O* Proposition

To find out if a Term is distributed in a Proposition :-

If it is subject — see quantity:

- If universal the term is distributed.
- If it is particular the term is not distrited.

If it is predicate — see quality:

- If it is affirmative the term is not distributed.
- If it is negative it is distributed.

Opposition of Propositions.

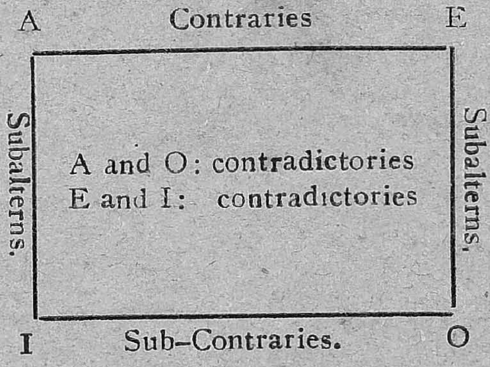
Two propositions may have the same subject and the same predicate, but they may :-

1. agree in quantity, but differ in quality.
2. agree in quality, but differ in quantity.
3. differ in both quantity and quality.

Eg. of 1. *A* and *E*; *I* and *O*.
2. *A* and *I*; *E* and *O*.
3. *A* and *O*; *E* and *I*.

Opposition of proposition = Relation of inclusion or exclusion between the propositions *A*, *E*, *I*, and *O*, taken two at a time, having the same subject and predicate, but differing in quantity or quality or both. This is indicated by a figure called.

The Square of opposition.



A and *E*	All	men	are	mortal beings	Contraries.
	No	men	*are*	mortal beings	
I and O	Some	men	are	mortal beings.	Sub-contraries
	Some	men	are not	mortal beings.	

A and O All | men | are | mortal beings.
Some | men | are not | mortal beings.

E and I *No* | men | *are* | mortal beings.
Some | men | are | mortal beings.

} Con-tradictories

A and I All | men | are | mortal beings.
Some | men | are | mortal beings.

E and O *No* | men | *are* | mortal beings.
Some | men | are not | mortal beings.

} Subalterns.

Scheme of Opposition.

T=True, F=False, D=may or may not be true (doubtful)

	A	*E*	*I*	*O*
If *A* is true	—	F	T	F
If *E* is true	F	—	F	T
If *I* is true	D	F	—	D
If *O* is true	F	D	D	—

	A	*E*	*I*	*O*
If *A* is false.	—	D	D	T
If *E* is false.	D	—	T	D
If *I* is false.	F	T	—	T
If *O* is false.	T	F	T	—

Among contraries i. e., A and E { if one is true, the other is false; if one is false, the other is doubtful

Among contradictories A and O, E and I { if one is true, the other is false; if one is false, the other is true

Among Sub-contraries I and O { if one is true, the other is doubtful; if one is false, the other is true

Among sub-alterns, A and I	if the universal is true, the particular also is true
E and O	if the universal is false the particular is doubtful
	if the particular is true, the universal is doubtful
	if the particular is false the universal also is false.

Immediate Inference or Eduction.

Refers to the process by which a statement is expressed in a different form. The form of the statement is changed, but the meaning is not changed.

Difference between Opposition of propositions and Immediate Inference.

Opposition of Propositions.	Immediate Inference.
1. Form and meaning of the two propositions different.	1. Form different, but meaning same.
2. Subject and predicate in the two propositions same	2. Subject and predicate not necessarily same.
3. The truth of one proposition may or may not follow from the truth of the other.	3. If the given proposition is true, the inferred proposition is also true.

Kinds of Immediate Inference.

1. *Obversion*. By this, an affirmative proposition is stated negatively, or a negative proposition is stated affirmatively

Original proposition —— Obvertend

Inferred proposition —— Obverse

Act of changing —— To obvert.

Rules for obverse

After putting proposition in logical form, mark off by vertical lines sign of quantity, subject, copula and predicate. Then,

1. Retain sign of quantity
2. Retain subject
3. Change quality of copula; if it is affirmative, make it negative. If it is negative make it affirmative
4. Substitute for the predicate its contradictory.

For purpose of symbols :-

Contradictory of S is indicated by S'

Contrdictory of P is indicated by P'

pronounced ***S dash*** and ***P dash***

S a P s a p'

Obvertend All | men | are | mortal beings

| | × ×

Obverse No | men | are | immortal beings.

s e p

Note here quantity same and subject same But quality changes and predicate changes.

```
SeP                    S          e           P
                   ______________
                   |            |
Obvertend       No | thieves | are | honest persons
                   |       |      ×            ×
Obverse        All | thieves | are | dishonest persons
                      S          a            P'
SiP
Obvertend      Some | men    | are | rich persons.
                   |    S |      i×         P   ×
Obverse        Some | men | are not | not-rich per-
                                      sons or per-
                                      sons who are
                                      not rich
                          S        o          P'
SoP
Obvertend      Some | men | are not |  industrious
                                         persons
                   |    S |      o×         P   ×
Obverse        Some | men |   are    | persons who
                                      are not indus-
                                            trious
                          S        i          P'
```

Note: | = the Same × = opposite.

Original Propsition or Obvertend.	Obverse
S a P	S e P'
S e P	S a P'
S i P	S o P'
S o P	S i P'

If you are asked to give the obverse of a proposition

1st - Put the proposition in logical form and mark off sign of quantity, subject, sign of quality and predicate

2nd - Give the proposition its symbol as S a P, S e P, S i P, or S o P.

3rd - Find out obverse for the symbol i. e., for

S a P	S i P	S i P	S o P
|	|	|	|
S e P′	S a P′	S o P′	S i P′

4th: Substitute appropriate words for the symbols. You will then get the obverse.

Example

Statement: Every graduate can vote.

1. Logical form with markings.	All	graduates	are	persons who can vote
		|	|	|
2. Symbol.		S	a	P.
3. Obverse for symbol.		|	|	|
		S	e	P′
4. Substituting words for obverse symbol.	No	graduates	are	persons who cannot vote.
		S	e	P′

Note

a in obvertend becomes *e* in obverse
e in obvertend becomes *a* in obverse
i in obvertend becomes *o* in obverse
o in obvertend becomes *i* in obverse

S remains the same without change. P becomes P′

So, to get the obverse in symbolic form
you go from a proposition of the form S – P
to a proposition of the form S – P′

To do so :

1. Retain S
2. Change a into e, e into a, i into o, o into i — as the case may be
3. Change P into P′

II. Conversion.

Subject becomes predicate and predicate becomes subject

Original proposition ... ... convertend

Inferred proposition ... ... converse

Act ... ... to convert.

Form of convertend	S – P
form of converse	P – S

Note: Quality of proposition does not change.

Rule of conversion

If a term is not distributed in the convertend, it must not be distributed in the converse

But the rule does not say that if a term is distributed in the convertend, it must be distributed in the converses also. It may or may not be distributed in the converse. So, bofore converting, find out what terms are not distributed in the convertend. After you make the converse, make sure that the term *not* distributed in the convertend is also *not* distributed in the converse.

(1) *S a P*

Convertend All | men | are | mortal beings.
S a P

Procedure for converse } Make S and P change places

Then it will be

All | mortal beings | are | men
P a S

But mortal beings (P) in convertend is not distributed. For it is predicate of an affirmative proposition. So it must not be distributed in the converse.

So you must not say "All mortal beings"

But only "Some mortal beings"

So converse will be Some | mortal beings | are | men
P i S

This converse for A proposition by which the proposition loses quantity (i. e. instead of being universal, it has become particular), is called *Converse by limitation* or *converse per accidens*

There is another kind of converse for A proposition.

Eg.	All	equilateral triangle	are	equiangular triangles
		S	a	P

Here both S and P are distributed. For, the denotation of equiangular triangles is equal to the denotation of equilateral triangles. So, P is to be understood its entire extent though it is predicate of an affirmative proposition.

So converse can be

All	equiangular triangles	are	equilateral triangles
	P	a	S

This is called *simple converse* of A proposition

Two kinds of converse for A proposition

Simple converse
S a P
becomes P a S
when both subject and predicate are distributed in the convertend

Converse per accidens
S a P
becomes P i S
when subject only is distributed but predicate is not distributed in the convertend

Singular propositions which always have A for logical form. } are converted simply

Dr. Rajendra Prasad	is	the President of the Indian Union
S	a	P

Converse:

The President of the Indian Union	is	Dr. Rajendra Prasad
P	a	S

(2) *S e P*

Convertend: No | foreigner | is | a voter
S e P

Converse: No | voter | is | a foreigner
P e S

Both subject and predicate are distributed both in convertend and in converse. For, the proposition is universal distributing subject and negative distributing predicate.

(3) *S i P*

Convertend: Some | students | are | failures
S i P

Converse: Some | failures | are | students
P i S

(4) *S o P*

Convertend:	Some	good speakers	are not	good writers
		S	o	P
Converse:	Some	good writers	are not	good speakers
		P	o	S

But here *good speakers* is not distributed in the convertend as it is subject of a particular proposition. But it is distributed in the converse as it is predicate of a negative proposition. So the rule of converse namely:

If a term is not distributed in the convertend it must not be distributed in the converse, is violated.

So O proposition has *no converse*.

Convertend	Converse
S a P	simple - P a S per accidens P i S
S e P	P e S
S i P	P i S
S o P	Nil

To get converse of a proposition.

1. Write it in logical form and mark off.

   Quantity | subject | quality | predicate.

2. Give symbol to convertend.
3. Find from it symbol of converse as follows:-

Convertend:	S a P	S e P	S i P	S o P
Converse:	P i S	P e S	P i S	Nil

4. Substitute words for symbol of converse.

   Eg. Every student does not pass.

   L. F. (Logical form)

Some | students | are not | persons who pass
s o p

As it is O proposition, it has no converse.

A few sailors were rescued.

L. F. Some | sailors | are | persons who were | rescued
s i p

Symbol of converse: P i S.

Substituting words for symbol.	Some	persons who were rescued	are	sailors.
		p	i	s

III. Contrapositive.

Original form - S - P

Contrapositive Form

Partial contrapositive.	Full contrapositive.
P′ - S	P′ - S′
Substitute for subject, contradictory of predicate and substitute for predicate, the original subject.	Substitute for subject contradictory of predicate and substitute for predicate contradictory of subject.

To get partial contrapositive:-

1st obvert the original proposition.

2nd convert *this obverse*

To get the full contrapositive.

Obvert the partial contrapositive.

Note. Contradictory of S is S′

" " S′ is S

" " P is P′

" " P′ is P.

Original proposition S a P

To get partial contrapositive:-

1st obvert S a P - you get S e P′

Then convert S e P' - you get P' e S.

P' e S is partial contrapositive of S a P

To get full contrapositive of S a P. Take partial contrapositive and obvert it. Partial contrapositive of S a P is P' e S. The obverse of P' e S is P' a S'. So, P' a S' is the full contrapositive of S a P.

Similarly, for S e P the partial contrapositive will be P' i S and the full contrapositive will be P' o S'.

Original proposition.	its obverse	converso of this obverse or partial contrapositive	obverso of the partial contrapositive or full contrapositive.
S a P	S e P'	P' e S	P' a S'
S e P	S a P'	P' i S	P' o S'
S i P	S o P'	no converse for O Proposition. So no partial contrapositive for S i P.	And so no full contrapositive also.
S o P	S i P'	P' i S'	P' o S'

To get full or partial contrapositive of a statement:—

1. Write L. F. marking quantity, subject, quality and predicate

2. Give symbols

3. Find partial or full contrapositive of symbolic form as required

4. Substitute appropriate words

Eg. Every man is a mortal being

L. F.	All	man	are	mortal beings
Symbol		S	a	P
Partial contrapositive in symbol.		P′	e	S
Substituted words	No	immortal beings	are	men
Full contra-positive in symbol		P'	a	S'
Substituted words	All	immortal beings	are	beings who are not men

As we first obvert and then convert to get the partial contrapositive, so the partial contrapositive is also called *obverse* which is *converted* or *converted obverse*.

IV. Obverted converse.

Original proposition form S - P

Obverted converse form P - S'

To get this

1st :- convert original proposition. Then the proposition of the form S - P will become P - S.

2nd :- obvert this P - S form It will become P - S'.

Original proposition	1st convert. (converse)	2nd obvert the converse or (obverted converse).
S a P	P i S	P o S'
S e P	P e S	P a S'
S i P	P i S	P o S'
S o P	No converse (Nil)	No obverted converse (Nil)

Eg. Original proposition.

Some | men | are | clever beings.

Symbol	S	i	p
Symbol for obverted converse	p	o	S'

Substituted words.

Some | clever beings | are not | beings who are not men

V. Inverse:

2 kinds : Partial and full.

Original proposition form	...	S - P
Partial Inverse form	...	S' - P
Full Inverse form ...	...	S' - P'

To get Inverse of *S a P*.

1st Obvert S a P—you get S e P'
2nd Convert this S e P'—you get P' e S
3rd Obvert P' e S—you get P' a S'
4th Convert P' a S'—you get S' i P' (This is full inverse)

5th Obvert S' i P'—you get S' o P (This is partial inverse)

To get Inverse of *S e P*.

1st Convert S e P—you get P e S

2nd Obvert P e S—you get P a S'

3rd Convert P a S'—you get S' i P (This is partial inverse)

4th Obvert S' i P—you get S' o P' (This is full inverse).

So

		Partial Inverse is	Full Inverse is
For	S a P	S' o P	S' i P'
For	S e P	S' i P	S' o P'

S i P and S o P have *no* inverse, for in dealing with them, at some stage an O proposition will have to be converted and we cannot proceed further.

Example of Inverse for S a P.

Original proposition	All | men | are | mortal beings			
	S	a		P
Symbol	S	a		P
Symbol of partial inverse	S'	O		P
Substituted words	Some | not-men | are not | mortal beings			
Symbol of full inverse.	S'	i	p	
Substituted words.	Some | not-men | are | immortal beings.			

Example of Inverse for *S e P*.

Original proposition	No |	tigers |	are |	grass eating [animals	
		S	e	P	
Symbol.		S	e	P	
Symbol of partial Inverse.		S'	i	p	
Substituted words.	Some |	non-tigers |	are |	grass [eating animals	
Symbol of full Inverse.		S'	o	P'	
Substituted words.	Some |	non-tigers |	are not |	[non-grass eating animals	

To easily remember the full inverse of A and E:

For S a P, write its subaltern S i P. Then write contradictory of S and P as S' and P'. Then you will have S' i P'.

For S o P write its subaltern S o P. Then write contradictory of S and P as S' and P'. Then you will have S' o P'.

Table of Immediate Inferences or Eductions.

Original proposition	Obverse.	Converse.	Contrapositive		Obverted converse.	Inverse	
			Partial	Full		Partial	Full
S a P	S e P'	P i S P a S	P' e S	P' a S'	P o S'	S' o P	S' i P'
S e P	S a P'	P e S	P' i S	P' o S'	P a S'	S' i P	S' o P'
S i P	S o P'	P i S	Nil	Nil	P o S'	Nil	Nil
S o P	S i P'	Nil	P' i S	P' o S'	Nil	Nil	Nil

Note :- If the logical form of a sentence and its expression in symbolic form are wrong, then all immediate inferences based on this wrong logical form and wrong symbolic form will also be wrong. So care must be taken to put the given statement in correct L. F. and symbolic form.

Four kinds of questions may be asked on Immediate Inference.

1. Give all possible immediate inferences of the following statement :-

In answer to this, put the statement in L. F., give its symbolic form derive from it where possible its obverse, converse, partial and full contrapositives, onverted converse and partial and full inverses.

A proposition has all the 7 Eductions.

E proposition has all the 7 Eductions.

I Proposition has only 3 Eductions, no contrapositives and no inverses.

O Proposition has only 3 Eductions, not the converse, the obverted converse and the 2 inverses.

2. What is the relation between the first and each of the succeeding propositions in the following :-

(1) Only graduates can vote.

(2) All graduates can vote.

(3) All who can vote are graduates.

(4) No graduates can vote.

To answer this questions :-

First put the first proposition in L. F.

It will be : No | non-graduates | are | persons [who can vote

Symbol : S e P

Then put the 2nd proposition in L. F and give it its symbol *in terms of the 1st proposition.* It will be

All | graduates | are | persons who can vote
S' a P

graduates is S. So *non-graduates* is S'.

The relation between 1st proposition and 2nd proposition is the relation between S e P and S' a P. In what kind of immediate inference do you go from S – P to S' – P ?

It is in partial inverse. So the 2nd proposition *look like* the partial inverse of the 1st proposition. Then ask what is the partial inverse of S e P. You will get it as S' i P. But the given 2nd proposition is S' a P. Between S' i P and S' a P, subject and predicate are same. So the relation must be found in the square of opposition That is: In the square of opposition what is the relation between I and A? It is subaltern universal. So the 2nd proposition S' a P is the subaltern (universal) of the partial inverse of the first proposition.

3rd Proposition: L. F.

All | persons who can vote | are | persons who [are graduates

Symbolic form *in term of the 1st.*	P	a	S'

Q: What is the relation between S e P and P a S'? i.e. By what immediate inference do you go from S - P to P - S'?

It is by obverted converse.

What is the obverted converse of S e P. It is P a S'. So the 3rd proposition is the obverted converse of the first.

4th Proposition L. F.

No | graduates | are | persons who can vote.

Symbol *in terms of the first.*	S'	e	P

Q: What is the relation between S e P and S' e P. i. e. How do you go from S - P to S' - P. By partial inverse.

What is the partial inverse if S e P. It is S' i P.

What is the relation between S' i P and S' e P. In the square of opposition it is contradictory. So, the 4th proposition is the contradictory of the partial inverse of the 1st proposition.

So, to answer a question of this kind, adopt the following step by step :-

1. Put the first of the statements (to which the relation of the rest is to be found) in L. F.

2. Give it its symbol.

3. Put the next statement in L. F.

4. Give it its symbol *in terms of the 1st proposition*. i. e. If it is "non-graduates" in the first with symbol S and 'graduates' in the second, in the second graduates will get the symbol S' whether it occurs as subject or predicate in the second proposition. Similarly 'persons who can vote' in the first will be P. In the second 'persons who cannot vote' will be P' whether it occurs as subject or predicate in the 2nd proposition.

5. Write the 2 symbols one below the other i. e., the symbols for the first and for the next proposition.

6. Then ask yourself by what process you go from the form of the 1st proposition to the form of the 2nd proposition. You get a, e, i and o between subject and predicate i. e., to find relation between S a P and P' i S, ask yourself: how to go from S-P to P'-S. Find out by answer to this question what immediate inference is involved.

7. Then take the symbol of the 1st proposition and derive from it the immediate inference which is the answer to question 6.

8. If it is same as the next proposition whose relation is to be determined, give that as the relation between the two propositions.

9. If it is not the same, but still if the subject and the predicate of the 2nd proposition are same and they differ only in the symbol of quantity and quality, i. e., a, e, i or o, then refer to the square of opposition for the relation. Then say: the 2nd proposition is the contrary/contradictory/sub-contrary/sub-altern universal or particular of (here write the immediate Inference that you obtain as answer to item 6 above)—of the 1st proposition.

Example worked out as above :-

The relation between :-

All catholics are christians and

No non-christians are non-catholics.

1. L. F. of 1st statement

All | catholics | are | christians.

2. Symbol S a P

3. Logical form of 2nd proposition

No | non-christians | are | non-catholics

4. Symbol *in terms of 1st* P' e S'

5. Required to find how to go from S-P to P' - S'.

6. We go from S-P to P'-S' by full contrapositive.

7. Full contrapositive of S a P is P' a S'

8. 2nd proposition is P' e S'.

9. P' e S' and P' a S' have same subject and predicate. So refer to square of Opposition. Relation in Square of Opposition between E and A is

contrary. So relation between 2nd proposition P' e S' and the 1st proposition S a P is that the 2nd proposition is the contrary of the full contrapositive of the first proposition.

3rd type of Question

Given the list of statements for the 2nd type of question, you may be asked to say if each of the succeeding statements is true (or what you can infer about its truth) if the first is known to be true (or false). To answer this: Remember that any proposition derived from the first by any of the 7 kinds of immediate inference is true if the first is true (and false if the first is false). If the 2nd proposition cannot be got by immediate inference, but has to be referred in the last stage to the square of opposition, then find the relation according to the Table of Opposition between the derived immediate inference and the 2nd proposition and state the relation according to square of opposition and state True, False or Doubtful accordingly.

Example

State the relation between :-

A few Indians are good Cricketers
and
No Cricketers are non-Indians. }

and state if the second proposition is true if the first is true.

Procedure

1. L. F. of 1st proposition

   Some | Indians | are | good cricketers

2. Symbol. S i P

3. L. F. of 2nd proposition.

No | good cricketers | are | non-Indians

4. Symbol. in terms of the 1st. } P e S'

5. To go from S-P to P-S'

6. Immediate Inference involved is obverted converse

7. Obverted converse of S i P is P o S'

8. Given proposition is P e S'. As subject and predicate are same we must now refer to Square of Opposition.

9. In Square of Opposition P e S' is subaltern (universal) of P o S'

10. If S i P (1st proposition) is true, its obverted converse, P o S' is true. If P o S' is true, its subaltern universal in the Square of Opposition namely P a S' may or may not be true. So if the first proposition is true, the second may or may not be true. If the first is false, then by the table of opposition the second is also false. i. e.,

1st proposition	S i P	
Derived immediate Inference obverted converse.	P o S'	– False, if the first is false.
2nd proposition according to square of opposition sub altern universal.	P e S'	—False if obverted converse is false.

Other types of Immediate Inference.

1. Immediate Inference by Added Determinants.

Determinant = adjective

Added determinant = added adjective.

Immediate inference by added determinants.	= Immediate Inference by the same adjective added to the subject and the predicate of a proposition.

Example : A man | is | a rational animal.

Add the determinant (adjective) ***good*** to both ***man*** (subject) and ***rational animal*** (predicate). Then the proposition will be :

A good man is a ***good*** rational animal.

This proposition in which the same determinant or adjective (i.e, good) is added to the subject and predicate of the first proposition is validly inferred from the first. So this immediate inference by added determinant right.

Example of a ***wrong type*** of this inference :-

A hut is a building.

A ***huge*** hut is a ***huge*** building.

Here the determinant ***huge*** has one meaning when applied to ***hut*** and another meaning when applied to ***building***.

A ***huge hut***, however huge ***as a hut*** cannot be a huge building absolutely. So this inference is wrong.

Rule for Immediate Inference by Added Determinants :-

The determinant added *must have the same meaning* when added to the subject and when added to the predicate.

2. *Immediate Inference by Complex Conception.*

By this, in the inferred proposition, the subject and predicate are referred to as parts of a bigger or complex idea in the original proposition.

Example: A pencil is a writing instrument. Then it follows: Half of a pencil is half of a writing instrument. This is valid. Example of *wrong Immediate Inference by complex conception* :-

All Brahmins are Hindus. A majority of brahmins are a majority of Hindus. Though it is true that All Brahmins are Hindus, it does not follow that a majority of Brahmins are a majority of Hindus.

Suppose Hindus are	...	100
Brahmins ...	...	10
Majority of Brahmins will be		6
Majority of Hindus will be		51

If majority of Brahmins is majority of Hindus then 6 must be equal to 51, which is wrong. So this inference is invalid.

Is it right to call Immediate Inference an Inference at all ?

Immediate Inference sometimes referred to as "the so-called" process of Immediate Inference. The word So-called shows it is wrongly called *Inference* as it does not possess marks of a proper inference. Such Marks are:- 1. Novelty 2. Necessity.

Novelty=The inferred idea must be new, not known previously. It is argued that in immediate inference when passing from

Rama is an honest man

to Rama is not a dishonest man, no new idea is got It is only old idea put negatively. So there is no novelty in the inferred proposition.

We reply

Though there is no novelty, there is necessity i. e., The inferred idea follows necessarily from original idea. That is a mark of inference. Moreover, there is novelty too. The second proposition puts the first in a new form. There is novelty of form though there is no novelty of meaning. Moreover the inferred proposition brings to light the varied implications of the first. So in immediate inference, there are both novelty and necessity. It can be called an inference quite properly.

Propositions.

Categorical	Hypothetical	Disjunctive
A is B.	If A, then B.	A or B
All men are mortal beings.	If you get the minimum, you will pass.	Either it is a mango tree or it is a margosa tree
That tree is a mango tree.	If I am free, I shall attend.	
Absolute or unconditional statement.	Conditional statement.	Statement of alternatives.

In Hypothetical statement, condition is called *antecedent*, what follows from the condition is called *consequent*.

If A is B	*C is D*
|	|
Condition or Antecedent.	Consequent.

Syllogism.

is the name given to a logical argument, i. e., an argument put in logical form. Such argument contains the conclusion and the reasons or grounds in support of it. The conclusion is said to be derived or *deduced* from the reasons So, the argument is called a *deductive* argument or an argument in *deduction*. Usually 2 reasons are given. The reasons are statements which have relatión to each other. Together they make up a connected fact and lead to the conclusion. The reasons are called *premises* of the Syllogism.

Example:

Premises { All catholics are followers of the Pope.
Mr. A B is a catholic.

Conclusion: Mr. A B is a follower of the Pope.

This is called a Categorical Syllogism; for, the premises and the conclusion are all categorical propositions. Sometimes, only one premises and the conclusion may be given. The other premise must be discovered and the argument put in logical form with 2 premises and conclusion.

Subject of conclusion ... Minor Term
Predicate of conclusion ... Major Term
Premise in which Major term occurs ...
Major Premise
Premise in which Minor term occurs ...
Minor Premise

So Syllogism has 1. Major Premise
2. Minor Premise
3. Conclusion.

Major Premise has major term and another term.

Minor premise has minor term and this other term. The term common to both premises is called Middle Term. It occurs in both the premises but not in the conclusion which has only the Minor Term and the Major Term.

Rules of a categorical Syllogism.

1. Every syllogism has 3 propositions making up the 2 premises and the conclusion.

2. Every syllogism has 3 terms, the Major Term, the Minor Term and the Middle Term. The Middle Term is so called because it is the mediating link connecting the Major term and the Minor term.

3. The Middle Term must be used in the same sense (must have the same meaning) in the 2 premises. Otherwise the *Fallacy of Ambiguous Middle* will be committed.

4. The Middle Term must be distributed once atleast in the premises i. e. it must be distributed in one of the premises atleast. (It *may be* distributed in both). Otherwise the Fallacy of ***Undistributed Middle*** will be committed.

5. If a term is not distributed in its premises' it must not be distributed in the conclusion.

If major term is distributed in the conclusion.	but it is not distributed in the major premise	the fallacy of *Illicit Major* is committed
If minor term is distributed in the conclusion	but it is not distributed in the minor premise	the fallacy of *Illicit Minor* is committed

Note :- It does not matter if a term is distributed in its premise but it is not distributed in the conclusion.

6. No conclusion can be got if both the premises are negative. Then the fallacy of *two negatives* will be committed.

7. If one premise is negative, conclusion will be negative.

Corrollaries.

8. No conclusion can be got if both premises are particular.

9. If one premise is particular, then the conclusion will be particular

Proof of the Corrollaries.

No conclusion from 2 particular premises.

Possible combinations of 2 particular premises are :-

	I	I	O	O	Major premise.
O }	I,	O,	I,	O	Minor premise.

O } invalid because both premises are negative.

I } No term is distributed in either premise.
I } So Middle term will not be distributed.
Fallacy of undistributed Middle is committed

I | Subject and predicate not distributed.
O

Conclusion negative as one premise, ie., Minor premise is negative Predicate of the conclusion is distributed as predicate of a negiative proposition i.e, Major term is distributed in the conclusion, but not in the Major premise So fallacy of Illicit Major.

O Two terms must be distributed, one major term,
I the other middle term. Only one term is
—— distributed.
Neg. So either Illicit Major or undistributed Middle.

So no combination of 2 particular premises gives valid conclusion.

If one premise is particular, conclusion must be particular. Conclusion must be particular=it cannot be universal, i.e., *S* cannot be distributed in the conclusion.

Note that in every Syllogism.

1. The middle term must be distributed. (at least once).

2. If one premise is negative, the major term should be distributed.

3. For S to be distributed in the conclusion, it must be distributed in the Minor premise.

So, for S to be distributed in the conclusion :-

1. If both premises are affirmative
M and S should be distributed [in the premises.

2 If one premise is negative
M, P and S should be distributed [in the premises.

Possible combinations in which one premise is universal and the other particular are :-

A	A	E	E	I	I	O	O
I	O	I	O	A	E	A	E

Of these E and O are in valid as both premises
O E [are negative.

I is in valid because it commits illicit major
E

Note in the following *x* means that the term in whose place it is printed *is not* distributed.

y means that the term in whose place it is printed *is* distributed.

x I *x*
y E *y*
S neg. P

One premise negative. So conclusion negative.

P distributed in the conclusion, but not in major premise. so Illicit Major.

So, we are left with

A A E I O
I O I A A

Of these, A and I are combinations of 2
I A [affirmative premises.

To give a valid conclusion, in which S is distributed, 2 terms must be distributed in the premises. The Middle term and the Minor term (M)
(S)

In y A x only one term is distributed
x I x (S is not distributed in Minor Premise)

In x I x
y A x only one term is distributed

So, A } I } commits illicit Minor if conclusion is [universal.

I } A } will commit either illicit Minor or [Undistributed Middle.

A E O
O I A have each a negative premise

So for S to be distributed in conclusion, 3 terms M, P and S should be distributed.

y A x x O y	distributes 2 terms only	So none of these combination can give a valid conclusion in which Minor term S is distributed in the conclusion
y E y x I x	distributes 2 terms only	
x O y y A x	distributes 2 terms only	

So, if one premise is particular, the conclusion must be particular.

Figures of a Syllogism.

M (Middle Term) occurs once in the Major premise and again in Minor premise.

In major premise it can be subject or predicate. In Minor premise also it can be subject or predicate. So in the 2 premises M can occupy 2 sets of positions in each.

1 Subject of Major premise and predicate of Minor premise

2. Predicate of both premises

3. Subject of both premises

4. Predicate of Major premise and subject of Minor premise.

These different positions are called different Figures of a Syllogism.

	I Figure		II Figure		III Figure		IV Figure	
	M	P	P	M	M	P	P	M
	S	M	S	M	M	S	M	S
∴	S	P	∴S	P	∴S	P	∴S	P

Figure of a syllogism depends on the position of the Middle Term in the 2 premises.

Moods of Syllogism.

Q: Which combinations of propositions as premises will give a valid conclusion in the various figures?

Possible combinations of propositions are :-

A	A	
A	E	
A	I	
A	O	
E	A	
E	E	– 2 negatives – invalid.
E	I	
E	O	– 2 negatives – invalid
I	A	
I	E	– Illicit major, invalid
I	I	– 2 particulars, invalid
I	O	– 2 particulars and [illicit major invalid
O	A	
O	E	– 2 negatives, invalid
O	I	– 2 particulars, invalid
O	O	– 2 negatives and 2 parti- [culars invalid

So, possible valid combinations are :-

A A, A E, A I, A O, E A, E I, I A, O A.

Q: Which of these combinations will give a valid conclusion in the several figures?

That depends on their satisfying the Special Rules of each figure.

Special Rules of the I Figure.

1. Minor premise must be affirmative.
2. Major premise must be Universal.

Proof.

Form of I Figure.	M	P
	S	M
∴	S	P

Proof of 1st rule: *Minor premise must be affirmative.*

If it is not affirmative, it will be negative.

If it is negative, conclusion will be negative

If conclusion is negative, P in the conclusion will be distributed

If P is distributed in the conclusion, it must be distributed in the major premise.

In major premise, P is predicate

For P to be distributed there as predicate, Major premise must be negative, for negative proposition alone distributes its predicates.

We have already supposed that Minor premise is negative, then both premises will be negative. From two negative premises, no valid conclusion can be got. So, our first supposition that Minor premise may be negative is wrong. So Minor premise must be affirmative.

Proof of 2nd rule: Major premise must be universal. By 1st rule Minor premise is affirmative. In it M, the middle term is predicate. Affirmative proposition does not distribute its predicate. So M is not distributed in Minor premise. So it must be distributed in the Major premise. In the Major premise M is subject. Universal propositions alone

distribute their subjects. So Major premise **must** be universal.

So, of the possible combinations :—

A A, A E, A I, A O, E A, E I, I A, and O A. the following combinations alone satisfy the special rules of I figure i. e., Minor premise affirmative and Major premise Universal.

A A, A I, E A, and E I. Putting them in Figures, slightly changing the order, we will have

M a P	M e P	M a P	M e P
S a M	S a M	S i M	S i M
∴ S a P	∴ S e P	∴ S i P	∴ S o P
Barbara	Celarent	Darili	Ferio

Under each combination, the conclusion derived is given. Under each conclusion, the Mnemonic name is given, the order of the vowels in each name giving order of Major premise, Minor premise and Conclusion.

Special Rules of II Figure.

1. One premise must be negative and the conclusion therefore negative
2. Major premise must be universal

Proof

Form of II figure :-

P M
S M

∴ S P

1. Middle term is predicate in both premises. It should be distributed atleast once.

Negative proposition alone distributes its predicate.

So for M to be distributed as predicate of one of the premises, one of the premises should be negative. As one premise is negative, according to general rules, the conclusion should be negative.

2. As one premise is negative according to 1st rule, conclusion will be negative. In the conclusion, P (major term) as predicate of a negative proposition will be distributed; for, a negative proposition distributes its predicate.

If P is distributed in the conclusion, it must be distributed in the major premise. Otherwise Illicit Major will arise. P is subject of major premise. Universal propositions alone distribute their subjects. So major premise must be universal.

Out of the 8 possible combinations :—

A A, A E, A I, A O, E A, E I, I A, O A those that satisfy the rules of the II figure, i. e , one premise negative and major premise universal, are :-

A E, A O, E A, O A. Re-arranging these, we get the following conclusions and Moods from them

P e M	P a M	P e M	P a M
S a M	S e M	S i M	S o M
∴ S e P	∴ S e P	∴ S o P	∴ S o P
Cesare	Camestres	Festino	Baroco

Special rules of the III figure.

1. Minor premise just be affirmative.
2. Conclusion must be particular.

Proof

Form of III figure :—

$$\frac{\begin{array}{cc} M & P \\ M & S \end{array}}{\therefore S \quad P}$$

1. Proof of 1st rule that Minor Premise should be affirmative :—

   Same as proof of 1st rule of I figure

2. Proof of 2nd rule :—

   By 1st rule, the minor premise is affirmative. Affirmative proposition does not distribute its predicate. Here S is predicate of affirmative minor premise. So it is not distributed. If S is not distributed in the minor premise, it must not be distributed in the conclusion. Otherwise, Illicit Minor will be committed.

So, if S is not distributed in the conclusion, it means the conclusion is particular. Particular propositions do not distribute the subject

Of the 8 possible combinations :—

A A, A E, A I, A O, E A, E I, I A, O A those which satisfy the rules of the III figure, that minor premise must be affirmative (and conclusion particular) are :—

A A, A I, E A, E I, I A and O A. Re-arranging them, we get from them the following conclusions and Moods :—

M a P	M i P	M a P	M e P	M o P	M e P
M a S	M a S	M i S	M a S	M a S	M i S
S i P	S i P	S i P	S o P	S o P	S o P
Darapati	Disamis	Datisi	Felapton	Bokardo	Ferison

(6 moods)

Special rules of IV figure.

1. If either premise is negative, the major premise must be universal.
2. If major premise is affirmative, minor premise must be universal.
3. If minor premise is affirmative, conclusion must be particular.

Proof

Form of IV figure :— P M
M S
———
∴ S P

Proof of 1st rule :- If either premise is negative, conclusion will be negative. If conclusion is negative, P in conclusion will be distributed. Then P must be distributed in Major premise to avoid Illicit Major. P is subject of major premise Universal proposition alone distributes its subject So Major premise should be universal

Proof of 2nd rule :- If major premise is affirmative, it does not distribute its predicate. M is predicate of major premise and is not distributed in that case. Then, if M is not distributed in Major premise, it must be distributed in minor premise to avoid Undistributed Middle. In the minor premise M is subject. Universal propositions alone distribute subject. So, Minor premise should be universal.

Proof of 3rd rule :- If minor premise is affirmative, conclusion should be particular. Same as for the 2nd rule of III figure. i. e., Minor premise affirmative = S not distributed in Minor premise.

So, should not be distributed in conclusion. i e., conclusion should be particular.

Of the possible combinations :—

A A, A E, A I, A O, E A, E I, I A, O A, those that satisfy the rules of the IV figures are :—

A A, A E, E A, E I, I A. Re-arranging them, we get from them the following conclusions and Moods.

PaM	PaM	PiM	PeM	PeM
MaS	MeS	MaS	MaS	MiS
∴ SiP	∴ SeP	∴ SiP	∴ SoP	∴ SoP
Bramantip	Camenes	Dimaris	Fesapo	Fresison

(5 Moods)

Names of Moods of Several figures.
(Mnemonic Lines)

I Figure: Barbara, Celarent, Darili, Ferio
II Fig. Cesare, Camestres, Festino, Baroko
III Fig. Darapti, Disamis, Datisi, Felapton, Bokardo, Ferison
IV Fig. Bramantip, Camenes, Dimaris, Fesapo, Fresison.

19 moods on the whole.

Peculiarities of each Figure.

I. Figure: 1. Here alone all 4 kinds of propositions i.e., A, E, I and O are got as conclusion.
2. Here alone can A proposition be got as conclusion.

II. Figure: Conclusion *negative* in all moods

III. Fig. Conclusion *particular* in all moods.

Strengthened and Weakened Moods.

Strengthened Mood. (premise, unnecessarily strong)

1. Conclusion particular.

2. But both premises universal though it is enough if only one premise is universal, the other premise being particular. Eg.

Darapti	Felapton	Bramantip
III-Fig.	III-Fig.	IV-Fig.
M a P	M e P	P a M
M a S	M a S	M a S
∴ S i P	∴ S o P	∴ S i P
Either major premise or minor premise may be I.	Either major premise may be O or minor premise may be I.	Major premise may be I.

and still the same conclusion can be got. The premises are unnecessarily strong.

Weakened Moods.

From a mood in which a universal conclusion is possible, we draw only a particular conclusion instead of a universal conclusion.

That is a weakened mood.

Eg.	I Fig.	I Fig.	II Fig.	IV Fig.
	Barbari.	Celaront	Cesaro.	Camenos.
	M a P	M e P	P e M	P a M
	S a M	S a M	S a M	M e S
	∴ S i M	∴ S o P	∴ S o P	∴ S o P
	instead of S a M (Barbara)	instead of S e M (Celarent)	instead of S e P (Cesare)	instead of S e P (Camenes)

To Put a given argument in Syllogistic Form.

Proceed in the following order :-

1. Find out the statement which is the conclusion. Note The conclusion is whatever follows: *Therefore*, *So*, *Consequently*, *Hence* and whatever precedes *Because or For*.

2. Put that statement in L. F. marking off.

    Quantity | Subject | Copula | Predicate.

(Remember No - are for universal negative.

3. Mark S under subject, P under Predicate and write a, e, i or o as the case may be under copula. Draw a line above this proposition.

4. In the other 2 statements, find that in which the predicate of the conclusion occurs. That is the major premise. Put that in L. F. marking off Quantity | Subject | Copula | Predicate in it.

5. Mark predicate of conclusion which occurs in major premise as P. Mark the other term as M. Write a, e, i or o as the case may be for copula.

6. The other statement is the Minor premise. It will contain the subject of the conclusion. Put it in L. F. and mark off its quantity | subject | copula | predicate.

7. Mark S under term which is also subject of the conclusion. Mark M under the other

term which will be the same M in májor premise.

Now you will have got Major Premise, Minor Premise and Conclusion. Eg: A few clevermen do not succeed in life, for, some clevermen are unfortunate and no unfortunate man can succeed.

1. Conclusion. A few clever men do not [succeed in life.

2.	L. F.	Some	clever men	are not	persons who succeed in life.
3.	Symbol.		S	o	P

4. Statement in which P occurs } No unfortunate men can succeed.

L. F.	No	unfortunate men	are	persons who succeed in life.

5.	Symbol.		M	e	P

6. The other statement } Some clever men are unfortunate.

	L. F.	Some	clever men	are	unfortunate men
7.	Symbols.		S	i	M

Putting them together in the order of

Major Premise
Minor Premise
———————
Conclusion

We get Major premise	No	unfortunate men	are	persons who succeed in life.
		M	e	P
Minor premise.	Some	clever men	are	unfortunate men
		S	i	M
Concusion.	Some	clever men	are not	persons who succeed in life.
		S	o	P

i. e.,

$$\begin{array}{l} M\ e\ P \\ S\ i\ M \\ \hline \therefore S\ o\ P \end{array}$$

I Figure, Ferio.

Note: Take care to see that the words of the Major term (P) in the Major premise and in the Conclusion are exactly same. That the words of Minor Term (S) in Minor Premise and in the Conclusion are exactly same and that the words of the Middle Term (M) in the two premises are exactly the same. You must write the L. Fs. of the statements in that way.

In all arguments major premise, minor premise and conclusion may not be given in that order. When we put the argument in syllogistic form, you must arrive at this order.

In some arguments the two premises alone may be given. You must draw the conclusion from them and then put all of them in L. F.

In some arguments one premise and the conclusion alone may be given. The other premise must be discovered. To do this you must know if the given premise is Major Premise or Minor Premise. Remember that if the given premise contains the subject of the conclusion, it is Minor Premise. If it contains the predicate of the conclusion, it is Minor Premise. Then you will know which premise is missing. From the Major Premise you can find the Middle Term (M). Combine it suitably to the argument with the subject of the conclusion and you will get the Minor Premise. Now you will have get

Major Premise
Minor Premise

Conclusion.

To test if an argument or syllogism is right:

Possible Fallacies in a Syllogism.

1. Fallacy of Four Terms.
2. Fallacy of Ambiguous Middle.
3. Fallacy of Undistributed Middle.
4. Fallacy of Illicit Major.
5. Fallacy of Illicit Minor.
6. Fallacy of Two Negative Premises.

1. Put the argument in Syllogistic form in the order of Major Premise, Minor Premise and conclusion.
2. Give the premises and conclusion their symbols.
3. Write the symbols of the premises and the conclusion separately one below the other.
4. Look at this syllogism in symbols and assure yourself

   (a) that there are 3 terms only and not four (For this you must look at the argument itself)

   (b) that the Middle Term has same meaning in the 2 premises (for this look at the argument itself)

   (c) that M is distributed in one of the premises atleast

   (d) if P is distributed in the conclusion, that it is distributed also in the Major premise.

   (e) if S is distributed in the conclusion, that it is also distributed in the Minor premise.

   (f) that both the premises are affirmative or that one is affirmative and the other is negative (i. e., see that both are not negative premises).

If any of these conditions is not fulfilled, write the corresponding fallacy. If all these conditions

are satisfied, note the position of the Middle Term in the 2 premises and determine the figure accordingly. Then see the symbols of the propositions in the order of Major premise, Minor premise and conclusion. That order in symbols gives the Mood. Its name can be found from the Mnemonic lines.

Examples.

Argument: All politicians are patriots, because some politician are honoured and all patriots are honoured.

L. F. of Syllogism : (L. F. = Logical Form)

	All	patriots	are	honoured men
		P	a	M
	Some	politicians	are	honoured men
		S	i	M
∴	All	politicians	are	patriots
		S	a	P

Symbols written separately: P a M
S i M
———
S a P

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Tests :—

1. Only 3 terms? — Yes
2. M same meaning in 2 premises? - Yes
3. M distributed in one premise atleast? - No. For M is predicate in both affirmative premises.

So fallacy of undistributed Middle

4. Is P distributed in conclusion? - No. Predicate of affirmative conclusion. So Illicit Major cannot arise.
5. Is S distributed in conclusion? - Yes. (Subjective of universal conclusion)

   Is it then distributed in Minor premise?- No. (Subject of particular Minor premise)

So *Fallacy of Illicit Minor committed.*

6. Are there 2 negative Premises? - No So fallacy of 2 negative premises does not arise.

So argument is wrong: Commits fallacies of Undistributed Middle and Illicit Minor.

An argument may commit one fallacy only or more than one fallacy. Examine it carefully till the end doing all the 6 tests on it.

As the argument is fallacious, there is no need to determine figure and mood, for figure and mood apply to correct arguments only and not to wrong arguments.

Reduction.

Process by which the Moods of figures II, III and IV are transformed into the form of the I figure and the same conclusion is shown to follow.

Reason for Reduction.

Aristotle considered the I figure alone to be perfect and looked on the other figures as imperfect.

Aristotle's reasons for considering figures II, III and IV as imperfect.

1. The I figure alone satisfies the *dictum de omne et nullo*.
2. In the I figure alone A, E, I and O propositions can be got as conclusion.
3. In the I figure alone can a Universal Affirmative conclusion (A proposition) be got.
4. In the I figure alone is the subject of the conclusion subject of the Minor premise and the predicate of the conclusion, the predicate of the Major premise—which are their natural positions in a Syllogism.

Dictum de omne et nullo: Whatever can be predicated affirmatively or negatively of the whole of a class can be likewise predicated of every part coming under it.

1. *Whatever* can be predicated —Major Term 2. Affirmatively or negatively —Quality 3. Of the *whole of a class* – Middle Term	Major premise
4. Can be likewise predicated	Conclusion
5. Of every *part*-Minor Term 6. Coming under *it* ie. whole of a class—Middle Term	Minor premise

Whatever can be predicated affirmatively (or negatively) of the whole of a class	***All men are mortal beings.*** (***Mortal beings*** predicated of the ***whole class of men.***

Of every part coming under it — *Rama is a man.* (*Rama* is a part of the *whole class of men.*

Can be likewise predicated — *Rama is a mortal being.* (*mortal being* is predicated of *Rama.*

Whole of a class—*Whole* refers to need to distribute middle term.

Likewise—refers to guarding against Illicit Major and Minor and conclusion being negative if one premise is negative.

Dictum refers also to 3 terms and 3 propositions in a Syllogism.

All rules of syllogism can be derived from the Dictum.

Aristotle said that arguments in I figure alone satisfy the dictum.

Though Aristotle said arguments in figures II, III and IV are imperfect, yet they are not logically wrong; for, they satisfy the general rules of the syllogism.

To prove these Moods are as valid as I Figure Moods, we reduce them to the form of I figure and show that even when put in that form the same conclusion is got and so the original Moods are valid. This is done by Reduction.

To reduce, we find some letters in the Mnemoic names useful. They are:—

1. First letter in the names of the moods of figures II, III and IV shows that each Mood should be reduced to a Mood of the I figure beginning with the same letter.

Example:

*C*easare in II Fig.	should be reduced to	*C*elarent of Fig. I
*D*arapti in III Fig.	,,	*D*arii of Fig. I
*C*amenes in IV Fig.	,,	*C*elarent of Fig. I
*F*esapo in III Fig.	,,	*F*erio of Fig. I
*B*ramantip in IV Fig.	,,	*B*arbara of Fig. I

2. Letter *S* in the name of Mood in II Fig, III Fig. and IV Fig. shows that the proposition indicated by the vowel immediately preceding it should be *converted simply*.

3. Letter *P* in the name of a Mood in Figures II, III and IV shows that the proposition indicated by the vowel immediately preceding it should be *converted per accidens*.

4. Letter *M* in the name of a Mood in Figures II, III and IV shows that the propositions of the syllogism should be transposed i. e. the Major premise should become the Minor premise and the Minor premise

should become the major premise. *M* stands for *Mutatis* i. e. change or transpose.

5. Letter *K* in Baroko II figure and in Bokardo III figure shows that an *Indirect Method of Reduction* should be adopted in their case.

To sum up: In the names of moods in Figures II, III and IV.

1. First letter shows corresponding Mood of I Fig. beginning with the same letter to which it should be reduced.
2. S=convert simply.
3. P=convert per accidens.
4. M=transpose premises.
5. K=adopt indirect method of reduction.

Example

Required to reduce *Camestres* to I figure.

Camestres is in II figure

Its form is:

$$\begin{array}{c} P\ a\ M \\ S\ e\ M \\ \hline \therefore S\ e\ P \end{array}$$

Significant letters to reduce *Camestres* are :-

1. C=shows it should be reduced to *Celarent* I Fig.
2. M=shows premises should be transposed.
3. S=shows Minor premise E should be converted simply.

4. S = shows conclusion E should be converted simply.

Do these processes now on symbolic form of *Camestres*.

Comestres II Fig: P a M
S e M
—————
∴ S e P

S. L. (Significant Letter) 2 is M = transpose premises.

Transposed the premises will be : S e M
P a M
—————

S. L. 3 is S = old Minor Premise, now Major Premise S e M should be converted simply. S e M converted simply will be M e S.

So, we get M e S
P a M
—————

Conclusion will be P e S

(Note now S is Major Term and P is Minor Term)

S. L. 4 is S = Conclusion should be converted simply. Converting this conclusion P e S simply we get S e P which is the original conclusion.

And so the Mood will be M e S
P a M
—————
P e S (–S e P)

This is *Celarent* of Figure I.

P a M <—> S e M —> simple converse —> M e S
S e M   P a M ——————————> P a M

∴ S e P   P e S
simple converse —> S e P

So we get at last

M e S
P a M
———
∴ S e P

} Celarent I Figure.

Go through these steps as indicated for every Mood of Figures II, III and IV required to be reduced to I Figure form.

Indirect reduction of Baroko.

Baroko is in II Figure

Its form is

P a M
S o M
———
∴ S o P

If S o P (the conclusion) is false, its contradictory S a P must be true.

With P a M (the old Major premise) as new Major premise and this S a P as the new Minor premise, make a new syllogism.

You will then get

P a M
S a P

as premises. The conclusion here will be S a M. So, the 2nd syllogism will be of the form

P a M
S a P
———
∴ S a M

This conclusion S a M (of the new syllogism) is the contradictory of the old Minor premise S o M. According to rules of the syllogism, the premises of the given syllogism are true. So S o M is true.

So its contradictory S a M, the conclusion of the new syllogism is false.

If S a M is false, it must be so because either 1) the argument is wrong or 2) the premises of the 2nd syllogism are wrong.

The second syllogism is in the form of I Figure, Mood Barbara which is perfect. So, the argument is not wrong So, the premises must be false. But the major premise P a M is the old Major premise which is taken to be true. So, the new major premise is not false. So, the minor premise S a P must be false. If it is false, its contradictory S o P must be true. This is the conclusion of the original syllogism. So the original syllogism in Baroko in II figure is right.

Indirect reduction of Bokardo

Bokardo is in III figure

M a P
M a S

∴ S o P

If S o P is false, its contradictory S a P must be true. With this S a P as new major premise and the old minor premise M a S as the new minor premise construct a new syllogism.

It will be of the form

S a P
M a S

The conclusion of this will be M a P. So we get the 2nd syllogism of the form

S a P
M a S
———
∴ M a P

But this M a P is contradictory of the old major premise (of original syllogism) M o P. This M o P cannot be false; for it is the given premise and must be supposed to be true. So, if M o P is true, its contradictory, the new conclusion M a P must be false. The falsity of M a P, the conclusion of the 2nd syllogism may be because

either 1. form of argument of 2nd syllogism is wrong

or 2. the premises of 2nd syllogism are false.

But 2nd syllogism is in Barbara I Figure which is a perfect Mood. So, it is not wrong. So the premises must be wrong. Of the premises, the new Minor premise M a S is the old Minor premise. So that is not false. So the old Major premise S a P is false. If that is wrong, its contradictory, the conclusion of the 1st syllogism is true. So Bokardo is valid.

Baroko II Fig. & Bokardo III Fig. can also be reduced directly.

For this we use special mnemonic words :

Baroko is called *Faksoko*.

II—Fig.

P a M
S o M
———
∴ S o P

Significant letters in Faksoko.

1. F=reduce to *Ferio* of I Fig.
2. K=obvert major premise *a* (note here *K* stands for obversion).
3. S=convert this obverse.
4. K=obvert S o M.

P a M ... obverted —> P e M' —> converted M' e P
S o M ... obverted —> ... ... S i M'
∴ S o P ∴ S o P

Ferio I Fig.

Major premise first obverted next converted.

Minor premise is obverted

Then conclusion S o P is drawn.

Direct reduction of Bokardo III Fig.

New mnemonic word:

Bokardo is called *Doksamosk*.

III-fig.

Significant letters in Doksamosk.

1. D = reduce to Darii of I fig.
2. K = obvert major premise O.
3. S = convert this obverse simply.
4. M = transpose premises.
5. S = convert new conclusion (note: not O of the old conclusion)
6. K = obvert this converse.

M o P —> obverted —> M i P' —> converted

		P' i M
M a S	—>	M a S
∴ S o P		

Transposed M a S
P' i M

∴ P' i S —> converted S i P'
|
V
obverted
|
V
S o P.

Two kinds of questions on reduction.

1. An argument may be given in any Mood of the Imperfect Figures and you may be required to reduce it to I figure.

In this case :-

1. Put the argument in syllogistic form.
2. Give its symbols.

3. From the symbols, find what Figure and Mood it is.
4. Note down the Mnemonic word for this Mood.
5. Note down from the Mnemonic word, the significant letters for reduction.
6. Reduce the syllogism accordingly.

Example :-

Reduce the following argument to I Figure.

Some traders are dishonest men; for all shopkeepers are traders and some shopkeepers are dishonest

1. Argument in syllogistic form:

Some | shopkeepers | are | dishonest men
M i P

All | shopkeepers | are | traders
M a S

∴ Some | traders | are | dishonest men
S i P

2. Symbol of syllogism.
M i P
M a S
∴ S i P

3. Fig & Mood. III figure I A I.
4. Mnemonic word *Disamis*.
5. Significant letters

D. = reduce to Darii (I Fig.)

S. = convert mojor premise I simply

M.=transpose premises

S.=convert conclusion simply.

***Reduction* :**

Converting Major permise simply :

Some	dishonest men	are	Shopkeepers
All	shopkeepers	are	traders.

Transposing

All	shopkeepers	are	traders.
Some	dishonest men	are	shopkeepers.

∴ Some | dishonest men | are | traders.

Converting simply.

Some | traders | are | dishonest men.

2. (a) You may be asked to frame an original argument of your own in an Imperfect Mood and reduce it to the I fig.

(b) Given a conclusion, you may be asked to frame an argument in an Imperfect Mood (name given) and reduce it to I Fig.

If the conclusion is given, you must frame the premises discovering a Middle Term common to subject and predicate of the conclusion in a manner that will fall in the Mood given. Then adopt the procedure indicated above.

Example.

Make a syllogism in Baroko to prove that

Some | labourers | are not | efficient persons.

Here a common Middle term connecting *labourers* and *efficient persons* should be found. Let us say: *trained persons*

So we get — *M*=trained persons
P=efficient persons
S=labourers

Baroko is II fig.

Its form is

P a M
S o M
———
∴ S o P

Substitute *Efficient persons* for P
trained persons for M
and *labourers* for S.

and write the proposition giving signs of quantity and copula as in Baroko. You will get :-

All | efficient persons | are | trained persons
P a M

Some | labourers | are not | trained persons
S o M

∴ Some | labourers | are not | efficient persons
S o P

Then proceed to reduce following instructions for reduction.

Questions may also be asked bearing on the general rules of the syllogism. In such cases you must not refer to the Mnemonic lines, but you must argue on the basis of the general rules and finally you may verify your answer with reference to the mnemonic lines.

Example: Show why A proposition can be a conclusion in Fig. I only

Answer: 1. A proposition as conclusion means conclusion is S a P.

2. So both premises must be affirmative; for, if one premise is negative, the conclusion will be negative i. e., not *A*

3 Both premises must be Universal, for, if one premise is particular the conclusion will be particular.

So both premises affirmative and both premises universal. i. e. Both premises must be universal affirmative i. e., A.

So we get

$$\begin{array}{r c} & A \\ & \underline{A} \\ \therefore & A \end{array}$$

Major premise distributes only one term, i. e., Subject.

Minor premise distributes only one term, i. e., Subject.

Conclusion distributes Minor Term, i. e., S.

So, it should be distributed in Minor premise. Minor premise distributes only one term and that is the subject. So minor term S must be the subject of minor premise. Minor premise must be of the form: S a M.

In the minor premise M is not distributed; for, it is predicate of an affirmative premise. It must

be distributed in the Major premise. Major premise is A. It distributes subject only. So Middle term should be subject of Major premise. So Major premise will be of the form M a P.

So we get M a P
S a M

∴ S a P

This is I figure. (Barbara). So A proposition as conclusion can be got in the I Figure only.

Another type of Question :-

If the major term of a syllogism is distributed in its premise, but is not distributed in the conclusion, determine the Figure and Mood in which this occurs.

In all such cases, proceed *up from the conclusion*.

Major term is not distributed in the conclusion So conclusion is affirmative.

∴ S aff P

As conclusion is affirmative, both premises must be affirmative.

aff
aff

∴ S aff P

Major term is distributed in the major premise according to the question. We have seen above that major premise should be affirmative. Affirmative proposition does not distribute its predicate.

So, for major term to be distributed in affirmative major premise, the major premise should be universal and the major term should be subject in it. For universal propositions distribute their subjects. So, we will get

P Uni. aff.
aff

∴ S aff P

If P is the subject of the major premise, M will be its predicate. We will then get

P a M
aff

S aff P

M is not distributed in major premise as predicate of affirmative proposition. So, it must be distributed in the minor premise. Minor premise is affirmative and its predicate is not distributed. So, M must be distributed as subject of universal affirmative Minor premise and S the Minor Term must be its predicate. So we will get

P a M
M a S

S aff P

As S is not distributed in the minor premise where it is predicate of an affirmative proposition, it must not be distributed in the conclusion. i. e. the conclusion must be particular. We have already seen the conclusion must be affirmative. So, the conclusion must be particular and affirmative. i. e. I or S i P. So the syllogism will be

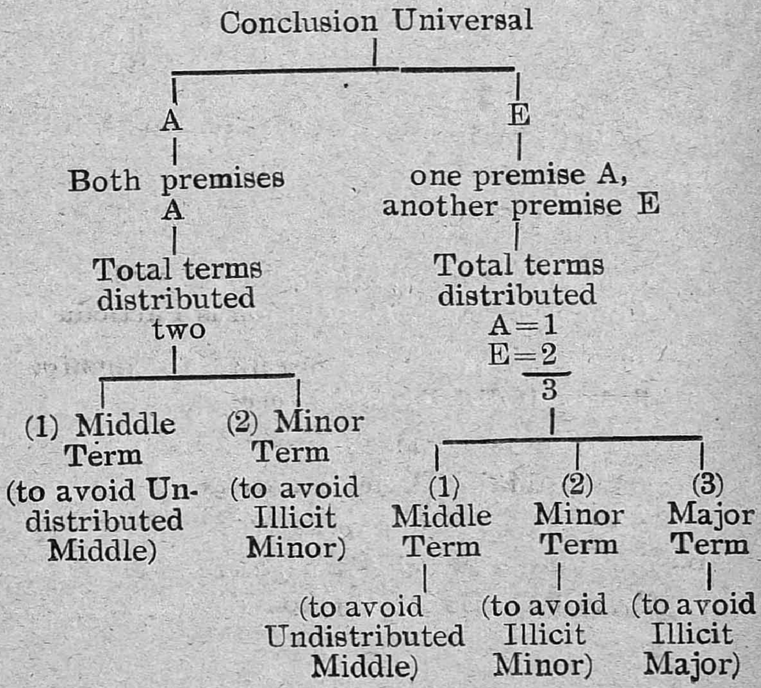
P a M
M a S
———
∴ S i P

This is IV figure Mood *Bramantip*.

Other questions of the same type to be argued ***not*** from mnemonic names, but from the general rules of the syllogism :-

Show that:

(1) ***When the conclusion is universal, the middle term can be distributed only once.***



So in both cases Middle Term distributed only once.

(2) *When the Middle Term is distributed twice, the conclusion is particular.*

Two Possibilities

Both premises affirmative	One affirmative and the other negative
Two terms distributed on the whole, ie. subjects of the 2 premises for Middle term to be distributed in each.	Three terms distributed on the whole. They must be (1) & (2) 2 Middle terms (3) Major Terms to avoid Illicit Major.
So Minor term not distributed in its premise.	So Minor term not distributed in its premise.

So Minor term should not be distributed in Conclusion i. e, Conclusion is Particular.

(3) *When the minor premise is negative, the Middle term is distributed only once.*

Minor Premise negative.
So Major Premise affirmative.

Major term should be distributed in Major Premise if one Premise is negative. Major premise is affirmative. So it does not distribute predicate.

So Major term P should be subject of universal Major Premise i.e. P a M. M, middle term is not distributed in P a M. So it is to be distributed only in Minor Premise i. e., only once.

(4) *When minor term is predicate of minor premise, the conclusion cannot be A.*

M S ——— ∴ S P	(1) If conclusion is A, S will be distributed in it. (2) If S is distributed in conclusion, it must be distributed in Minor premise which must be negative to distribute S which is predicate there. (3) As one premise is negative, the conclusion will be negative i.e., not A (universal) *affirmative.*

(5) *When the minor premise is negative, the major premise is universal.*

distri- P aff (uni) M: buted = neg | ——— . ∴ S neg P distri- = buted.	(1) If Minor premise is negative, Major premise is affirmative. (2) If Minor premise is negative, conclusion is negative. P (Major Term is distributed in it.)

(3) For P to be distributed in affirmative Major premise (to avoid Illicit Major) it should be subject of universal affirmative proposition.

So Major Premise should be universal.

(6) *An O proposition can never be a premise in the I Figure.*

I Figure M P
S M

S P

If one premise is O, the other premise must be A. For O = Particular and Negative

One premise Particular means the other premise Universal

One premise Negative means the other premise Affirmative

O A

(a) If O is major premise, M (subject) not distributed

and A is minor premise, M (predicate) not distributed

So Undistributed Middle.

(b) If A is major premise—> P (predicate) will not be distributed

and O is minor premise —> One premise being negative, conclusion will be negative and P (predicate will be distributed while not distributed in Major premise.

So Illicit Major.

So O cannot be Major premise or Minor premise in I Figure.

The Hypothetical Syllogism.

Major premise : Hypothetical proposition.
Minor premise : Categorical proposition.
Conclusion : Categorical proposition.

If A is B, C is D
A is B
————
∴ C is D

If you get a majority of votes, you will be elected.

You have got a majority of votes
∴ You are elected.

In the hypothetical proposition which is the major premise:

If A is B is called antecedent
C is D is called consequent

A is B : antecedent is affirmed
A is not B : antecedent is denied
C is D : consequent is affirmed
C is not D : consequent is denied

The premises of a hypothetical syllogism may be of 4 possible forms. They are :-

	In the Minor premise
1. If A is B, C is D A is B.	antecedent is affirmed.
2. If A is B, C is D A is not B.	antecedent is denied.
3. If A is B, C is D C is D.	consequent is affirmed.
4. If A is B, C is D C is not D.	consequent is denied.

Rule of a Hypothetical syllogism :-

In the minor premise either affirm the antecedent or deny the consequent.

Do not deny the antecedent or affirm the consequent in the minor premise.

Reason for the rule :

Major premise :- If you take quinine, you will be cured of Malaria.

Minor premise You take quinine
Conclusion You will be cured of malaria

Here you affirm the antecedent in the Minor premise.

Suppose you deny the antecedent. You will then have :—

Major premise | If you take quinine, you will be cured of malaria

Minor premise | You have not taken quinine
Conclusion You will not be cured malaria

You cannot say this.

For, you may take a kashayam or a unani medicine and be cured of malaria.

Taking quinine is not the *only* condition for being cured of malaria. There are other conditions also. If any of them is fulfilled, the consequent viz. cure of malaria, may follow. If one of the conditions is not fulfilled, it does not mean that the conclusion will not follow. So denial of antecedent in Minor premise will not lead to denial of consequent in conclusion.

Suppose you affirm the consequent in the minor premise. Then you will have :—

Major premise : If you take quinine, you will be cured of malaria

Minor premise : You are cured of malaria
Conclusion : you have taken quinine

This does not follow. You might have been cured as you took a kashayam or something else. Because the consequent occurs, it does not mean the antecedent given in the major premise has been satisfied. Some other antecedent of the consequent might have been fulfilled and the consequent might follow. So from affirmation of the consequent in the minor premise, you cannot pass on to the affirmation of the given antecedent in the conclusion.

But you may deny the consequent in the minor premise. Then you will have

If you take quinine, you will be cured of malaria.
You are not cured of malaria

∴ You have not taken quinine.

If the consequent is denied in the minor premise, i. e. if it has not happned, it means even the given antecedent has not happened and so, it may be denied in the conclusion.

This is because there can be more than one antecedent for the same consequent.

So we get as correct forms of Hypothetical syllogism:

If A is B, C is D	If A is B, C is D
A is B	C is not D
∴ C is D.	∴ A is not B.
Affirm antecedent in minor premise and therby affirm consequent in conclusion.	Deny consequent in minor premise and thereby deny antecedent in conclusion.
Modus Ponens	Modus Tollens

Exception to the rule of Hypothetical syllogism.

You can deny the antecedent or affirm the consequent in the minor premise if you know there are not two or more antecedent for that consequent, i.e., that the given antecedent is the *only*

antecedent for the given consequent. In that case you may also (a) deny the antecedent in the minor premise and deny the consequent in the conclusion and (b) affirm the consequent in the minor premise and affirm the antecedent in the conclusion.

Example :

Only if you pass your Inter, you will be admitted to B. A. That means : passing Inter is the only antecedent for the consequent of being admitted to B. A. There is no other condition. So in this case you can say :-

If you pass the Inter, you will be admitted to B.A.
You have not passed the Inter

∴ You will not be admitted to B.A.

Here antecedent is denied in minor premise and consequent is denied in conclusion.

You can also say :-

If you pass the Inter, you will be admitted to B.A.
You are admitted to B.A.

∴ You have passed the Inter.

Here consequent is affimed in minor premise and antecedent is affirmed in the conclusion. These are exceptional correct forms of Hypothetical syllogism. But the general rule is :-

Either affirm the antecedent or deny the consequent in the Minor premise thereby affirming consequent or denying antecedent respectively in the conclusion.

A Hypothetical proposition can also be stated as a categorical proposition.

Example:

If you take quinine, you will be cured of malaria. This is a hypothetical proposition. You put it as a categorical proposition as follows :-

All	cases of your taking quinine	are	cases of your being cured of malaria.
	S	a	P

Similarly a Hypothetical syllogism can be written as a Categorical syllogism.

Hypothetical syllogism :- Modus Ponens :

If you take quinine, you will be cured of [malaria.
You take quinine

∴ Your are cured of malaria

Categorical Syllogism form for above :-

All | cases of your taking quinine | are | cases of your being cured of malaria
M a P

This case | is | a case of your taking quinine
S a M

∴ This case | is | a case of your being cured of [malaria
S a P

M a P
S a M
———— Barbara I Figure.
∴ S a P

Hypothetical syllogism: Modus Tollens:

If you take quinine, you are cured of malaria
You are not cured of malaria

∴ You have not taken quinine.

Categorical syllogism for above:

All	cases of your taking quinine	are	cases of your being cured of malaria.
	P	a	M

This case	is not	a case of your being cured of malaria.
S	e	M

∴ This	case	is not	a case of your taking quinine.
	S	e	P

P a M
S e M
———— Camestrs II Figure.
∴ S e P

Wrong syllogism in Hypothetical form will lead to wrong syllogism in categorical form.

Fallacy in Hypothetical form.		Fallacy in categorical form
Denying the antecedent	—>	Illicit Major
Affirming consequent	—>	Undistributed Middle.

Wrong Hypothetical form (denying antecedent)

If you take quinine, you will be cured of malaria
You have not taken quinine.
∴ you are not cured of malaria.

Categorical form.

All	cases of your taking quinine.	are	cases of your being cured of malaria.
	M	a	P

This case | is not | a case of your taking quinine.
S e M

∴ This | case | is not | a case of your being cured of malaria.
S e P

M a P
S e M
———— Illicit Major.
∴ S e P

P distributed as predicate in the negative conclusion without being distributed as predicate of affirmative major premise.

Wrong Hypothetical form (Affirming the consequent)

If you take quinine, you will be cured of malaria
You are cured of malaria
————————
∴ You took quinine.

Categorical form for above :-

All cases of your taking quinine | are | cases of your being cured of malaria.
P a M

This case | is | a case of your being cured of [Malaria.
S a M
————————
∴ This case | is | a case of your taking quinine
S a P •

P a M
S a M Undistributed Middle.
————
∴ S a P

{M middle term is predicate of the 2 affirmative premises and is undistributed in them.

If antecedent is the only antecedent for the given consequent denying antecedent or affirming consequent in Minor premise will give valid conclusion both in Hypothetical and Categorical forms.

Hypothetical Major premise with *only antecedent*	Only Intermediates can go to B.A.

Denying Antecedent in Hypothetical form.

If you are Intermediate *only*, you can go to B. A.

You are not an Intermediate.

∴ So you cannot go to B. A.

Categorical form.

No | non-Intermediates | are | persons who can go to B.A.
M e P

You | are | a non-Intermediate
S a M

∴ You | are not | a person who can go to B.A.
S e P

M e P
S a M

∴ S e P

Celarent I Figure.

Affirming consequent in Hypothetical form.

If you are Intermediate only, you can go to B.A.

You have gone to B. A.

∴ You are Intermediate

Categorical form.

No | non-Intermediates | are | persons who can [go to B.A.
P e M

You | are | a person who has gone to B A.
S a M

∴ You | are not | a non-Intermediate
S e P

P e M
S a M

∴ S e P   Cesare II Figure.

To test validity of Hypothetical syllogism.

1. Put it in L. F. with Major premise, Minor premise and Conclusion.
2. See (a) if antecedent is one among a number of possible antecedents,
   or (b) only one antecedent for the consequent.
3. If it is one among a number of possible antecedents, then make sure that the minor premise either.
   (a) affirms the antecedent
   or (b) denies the consequent
   (and that the conclusion correspondingly either.)
   (a) affirms the consequent
   or (b) denies the antecedent.

If no fallacy is committed (i. e. if in Minor premise antecedent is not denied or consequent is not affirmed), then determine what is the mood of the Hypothetical syllogism, i. e. Modus Ponens or Modus Tollens.

To remember which is Modus Ponens and which is Modus Tollens.

Minor Premise

*A*ffirms = *P*onens

*D*enies = *T*ollens

In the alphabet A comes before D.

So also P comes before T

Remember A —> P
D —> T

Disjunctive Syllogism.

Major premise - Disjunctive proposition
Minor premise - Categorical proposition

∴ Conclusion - Categorical proposition

I Form :-

Major premise ... Either A is B or
C is D. (2 alternatives)

Minor premise ... A is B. (one alternative affirmed.)

Conclusion ∴ C is not D (the other alternative denied

By affirming one alternative in the minor premise, deny the other alternative in the conclusion.

By affirming, Deny
| |
v v
Ponendo Tollens *Modus Ponendo Tollens.*

II Form:

Major premise ... Either A is B
or C is D (2 alternatives)
Minor premise ... A is not B (one alternative denied)

Conclusion ∴ C is B (the other alternative affirmed)

By denying one alternative in the minor premise, affirm the other alternative in the conclusion.

By denying, affirm
| |
v v
Tollendo Ponens

Modus Tollendo Ponens.

You can also say

Either A is B or C is D
C is D. (*Modus Ponendo Tollens*)

∴ A is not B.

and Either A is B or C is D
C is not D *Modus Tollendo Ponens*

∴ A is B.

Either he is a Protestant or he is a Catholic
He is a Protestant Modus Ponendo
∴ He is not a Catholic Tollens

Either he is a Protestant or he is a Catholic
He is not a Protestant Modus Tollendo
∴ He is a Catholic Ponens

Rule for Disjunctive syllogism.

The members of disjunction (i. e, alternatives mentioned in major premise) must be

(a) mutually exclusive
and (b) collectively exhaustive

He is either a Hindu or a lawyer
He is a Hindu
∴ He is not a lawyer.

This is wrong; for *Hindu* and *lawyer* (the disjunctive members) are not mutually exclusive. Hindus may be lawyer also. i. e. A man may be both a Hindu and a lawyer. So if you say he is a Hindu, it is not that he cannot be a lawyer also.

He is either a lawyer or an engineer
He is not a lawyer
∴ He is an enginner.

This also is wrong.

Lawyer and Engineer, the two disjunctive members mentioned do not exhaust (complete) the possibilities. Other alternatives are possible like Teacher, Trades, Soldier, Doctor etc. If a man is not a lawyer, it is not that he is necessarily an Engineer. He may belong to anyother profession not mentioned in the major premise. All alternatives are not mentioned in the major premise. So the major premise is not collectively exhaustive.

To examine the validity of a Disjunctive syllogism :—

1. Put it in L. F. giving major premise, minor premise and conclusion

2. Look at major premise and see if the members of the disjunction (i. e, alternatives) are

1. mutually exclusive,
2. collectively exhaustive.

If (1) show how disjunction is not mutually exclusive

If (2) show what other alternatives have been omitted so that the disjunction is not collectively exhaustive.

If no fallacy is committed i. e. if members of the disjunction are mutually exclusive and collectively exhaustive, find out from Minor premise and conclusion what is the Mood of the disjunctive syllogism i. e. if it is

Modus Ponendo Tollens
or Modus Tollendo Ponens.

Dilemma

An argument referring to 2 alternative courses of action both of which lead to an unpleasant result. A person in a dilemma does not know what to do in the given situation.

Dilemma is a complex syllogism combining in itself Categorical, Hypothetical, and Disjunctive propositions

Types of Dilemma:—

Dilemma

- Simple — conclusion, a categorical proposition.
- Complex — conclusion a disjunctive proposition.

Dilemma

Constructive — conclusion affirmative.

Destructive — conclusion negative.

Combining these classifications, we have 4 kinds of Dilemma.

Dilemma

Simple constructive | Simple destructive | Complex constructive | Complex destructive

(1) *Simple Constructive Dilemma.*

If A is B, C is D, if E is F, C is D
Either A is B or E is F.

∴ C is D.

(2) *Simple Destructive Dilemma.*

If A is B, C is D or E is F
C is not D and E is not F

∴ A is not B.

(3) *Complex Constructive Dilemma.*

If A is B, C is D; If E is F, G is H
Either A is B or E is F

∴ Either C is D or G is H.

(4) *Complex Destructive Dilemma.*

If A is B, C is D; If E is F, G is H
Either C is not D or G is not H

∴ Either A is not B or E is not F

Difference between the 4 kinds of Dilemma.

Name of Dilemma.

1. Simple Constructive.

Major Premise.	Minor Premise.	Conclusion.
If A is B, C is D. If E is F, C is D Two hypothetical proposition with different antecedents, but a common consequent.	*Either* A is B *or* E is F The two antecedents disjunctively affirmed.	C is D. The common consequent categorically affirmed.

2. Simple Destructive.

Major Premise.	Minor Premise.	Conclusion.
If A is B, C is D or E is F. Hypothetical proposition with one antecedent and two alternative consequents.	C is not D *and* E is not F. The two consequents conjunctively denied.	A is not B. The single antecedent categorically denied.

3. Complex Constructive.

Major Premise.	Minor Premise.	Conclusion.
If A is B, C is D; If E is F, G is H. Two hypothetical propositions with different antecedents and different consequents.	*Either* A is B *or* E is F. The two antecedents disjunctively affirmed.	*Either* C is D *or* G is H. The two consequents disjunctively affirmed.

4. Complex Destructive.

Major Premise.	Minor Premise.	Conclusion.
As in Complex Constructive Dilemma.	*Either* C is not D *or* G is not H. The two consequents disjunctively denied	*Either* A is not B *or* E is not F. The two antecedents disjunctively denied

Dilemmas are generally wrong:

Because

1. One or both of the consequents may not follow from the antecedent concerned.

2. There is a third alternative in addition to the two mentioned in the hypothetical major premise.

3. Two different standards are adopted in the two hypothetical propositions.

The two alternatives of a dilemma are compared to the horns of a bull. So one is said to be in the horns of a dilemma.

How to escape a dilemma.

1. Taking the dilemma by the horns

2. Escaping between the horns of a dilemma.

3. Constructing a counter-dilemma i e. rebutting the dilemma.

1. *Taking the dilemma by the horns:* is to show that the consequent in one or both cases does not follow from the antecedent If the dilemma says If A is B, C is D, if E is F, G is H, we show " C is D" does not follow from " A is B ", and " G is H" does not follow from " E is F ". (one of these or both).

2 Escaping between the horns of a dilemma is to show that a third alternative is possible in addition to the two mentioned in the major premise If it is said:

If A is B, C is D; If E is F, G is H. We reply that in addition to A is B and E is F, another alternative I is J is possible and If I is J, K is L and point out that K is L is not an unpleasant consequence and the dilemma can be escaped from in that way.

3. *Rebutting a dilemma*: is to make a counter-dilemma which gives a conclusion opposite to the unpleasant one of the original dilemma i.e, which is pleasant.

Example: If A is B, C is D; If E is F, G is H
Either A is B or E is F
∴ Either C is D or G is H.

Rebuttal of this:-

If A is B, G is not H; If E is F, C is not D
Either A is B or E is F
∴ Either G is not H or C is not D

How to rebut a dilemma.

Taking a complex constructive dilemma which is usually rebutted, instead of the original major premise and conclusion, *substitute as follows*:-

Major premise: Combine the antecedent of the first hypothetical proposition with negative of the consequent of the second hypothetical proposition and make them into the first hypothetical proposition of the new dilemma. Then, combine the antecedent of the second hypothetical proposition with the negative

	of the consequent of the first hypothetical proposition and make them into the second hypothetical proposition of the new dilemma.
Minor premise:	Retain the old minor premise.
Conclusion :	Affirm the two denied consequents in the reverse order.

If A is B, G is not H; If E is F, C is not D
Either A is B *or* E is F

∴ Either G is not H or C is not D.

If a dilemmatic argument is given for examination :-

1. Put it in logical form. Find the conclusion, then the premises.
2. Identify it as to which of the 4 kind its belongs.
3. See if each consequent follows from its antecedent.
4. See if a third alternative is possible.
5. See if the same standard is adopted in the two hypothetical propositions and state the fallacy accordingly.

Examples of 4 kinds of Dilemma.

1. Simple constructive.

If a man acts according to his opinion.	he will be criticised.	If he acts according to another's opinion.	he will be criticised.

Either a man acts according to his opinion.	or	he acts according to another's opinion

In both cases he will be criticised.

2. *Simple Destructive.*

If a thing moves, either it must move where it is.	or	it must move where it is not.
A thing need not move where it is.	and	it cannot move where it is not.

So a thing cannot move.

3. *Complex Constructive.*

If I copy, I shall be punished; If I do not copy, I shall fail

Either I copy *or* I do not copy

∴ So either I shall be punished *or* I shall fail.

4. *Complex Destructive.*

If a man is clever, he will do things himself.	If he is earnest, he will take instructions from others.

This man does not do things himself *and* he does not take instructions from others

∴ He is neither clever nor earnest.

Rebuttal of a Dilemma.

Original Dilemma.

If I copy, I shall be punished; If I don't copy, I shall fail

Either I copy or I don't copy

∴ Either I shall be punished or I shall fail

Rebuttal.

If I copy, I shall not fail; If don't copy, I [shall not be punished

Either I copy or I don't copy

∴ Either I shall not fail or I shall not be [punished

Rebuttal is possible here because there are two different points of view (or standards) adopted in the two hypothetical propositions in the Major Premise. (1) my failing (2) my being punished. There will be no dilemma if one of them alone is adopted in both cases.

N. B:- Compare the above with the symbolic forms to understand clearly.

Chains of Reasoning

or

Sorites.

Generally, a conclusion is got from 2 premises. These 2 premises and conclusion together make up a single syllogism.

Sometimes, a conclusion is the result of more than 2 premises, i. e. of 3, 4 or 5 or more premises. For example, we may say:—

All E is A

because All B is A, All C is B, All D is C, So, All E is D. Here we have 4 premises in support of the conclusion all E is D. When put in syllogistic form, they become 3 syllogism as follows:—

Premises	Syllogism	Remark
All B is A All C is B ∴ All C is A	I Syllogism.	Conclusion of I syllogism becomes major premise of II syllogism.
All C is A All D is C ∴ All D is A	II Syllogism.	Similarly, conclusion of II syllogism becomes [major premise. of III syllogism.
All D is A All E is D ∴ All E is A	III Syllogism.	

I Syllogism goes before the II syllogism.	so it is called *Prosyllogism.*
II syllogism comes after the I syllogism.	so it is called *Episyllogism.*

Note :- II syllogism is Episyllogism with reference to the I syllogism and Prosyllogism with reference to the III syllogism.

The III syllogism is the Episyllogism of the II syllogism.

Example :

All good men are virtuous men
All godly men are good men

∴ All godly men are virtuous men
All godly men are virtuous men
All monks are godly men

∴ All monks are virtuous men.

All monks are virtuous men
All members of this society are monks.

∴ All members of this society | are | virtuous men

This chain of reasoning is called a Sorites in which the intermediate conclusions are suppressed and the premises alone are given.

All good men are virtuous
All godly men are good
All monks are godly
All members of this society are monks

∴ All members of this society are virtuous.

Sorites

Aristotelian

All A is B
All B is C
All C is D
All D is E

∴ All A is E

Goclenian

All A is B
All C is A
All D is C
All E is D

∴ All E is B

Expansion into Syllogisms

All B is C
All A is B

All A is B
All C is A

∴ All A is C (a)

All C is D
All A is C (a above)

∴ All A is D (b)

All D is E
All A is D (b above)

∴ All A is E

∴ All C is B (a)

All C is B (a above)
All D is C

∴ All D is B (b)

All D is B (b above)
All E is D

∴ All E is B

Peculiarities.

Sorites.

Aristotelian	Goclenian
1. Subject of conclusion is subject of first premise and predicate of conclusion is predicate of last premise.	1 Subject of conclusion is subject of last premise and predicate of conclusion is predicate of first premise.
2. In expanding, the second premise becomes the major premise of the first syllogism and each succeeding premise becomes major premise of each succeeding syllogism.	2. In expanding, the first premise is the major premise and each succeeding premise becomes minor premise of each syllogism.

3. Conclusion of a pro-syllogism becomes minor premise of the next episyllogism.	3. Conclusion of pro-syllogism becomes major premise of succeeding episyllogism.

Rules.

Sorites.

Aristotelian	Goclenian
(a) The first premise alone *may be* particular.	(a) First premise alone *may be* negative;
(b) The last premise alone *may be* negative. The intermediate premises *must be* universal and affirmative.	(b) The last premise alone *may be* particular. The other premises *must be* universal and affirmative.
(a) If any premise except first is particular, the syllogism in which that occurs will commit the fallacy of Undistributed Middle.	(a) If any premise except first is negative, in that syllogism, there will be Illicit Major.
(b) If any premise except last is negative in the next episyllogism, there will be Illicit major.	(b) If any premise except last is particular, in the next episyllogism there will be Undistributed Middle.

Aristotelian Sorites.

Suppose 2nd premise is particular, i. e. it is *Some B is C.* Then the syllogism will be :-

Some B is C }
All A is B } Undistributed Middle.

Suppose 3rd premise is negative i. e. No C is D Then we will have :-

Prosyllogism.	*Episyllogism.*	
No C is D	All D is E	
All A is C	No A is C	Illicit Major.
∴ No A is C.	∴ No A is E.	

Goclenian Sorites.

Suppose 2nd premise is negative. Then the syllogism will be.

All A is B
No C is A
∴ No C is B } Illicit Major.

Suppose 3nd premise is particular. Then the syllogisms will be.

Prosyllogism.	*Episyllogism.*	
All C is B	Some D is B	Undistributed Middle.
Some D is C	All E is D	
∴ Some D is B.		

Enthymeme.

Generally in an argument, both premises and conclusion are given. Sometimes one of these is

not given and the other two alone are given Such an incomplete argument is called an Enthymeme. These Enthymemes are said to be of 3 Orders.

Enthymeme of	I Order:	Major premise [not given
"	II "	Minor premise [not given.
"	III "	Conclusion [not given

Example :

I Order. Socrates is a man, so he is a [mortal being.

II Order. All men are mortal beings, so [Socrates is a mortal being.

III Order. All men are mortal beings and [Socrates is a man.

FALLACIES.

Fallacy means conclusion from an invalid thinking process - a wrong reasoning.

May be due to { (a) violation of rules of Logic
(b) false premises.

List of Fallacies.

I. In Immediate Inference :-

1. Wrong obversion.
2. Wrong conversion.

II. In Syllogistic Inference :-

(a) *In Categorical Syllogism* :

1. Four Terms 2. Ambiguous Middle

3. Undistributed Middle 4. Illicit Major 5 Illicit Minor.

(b) *In Hypothetical Syllogism* :

1. Denying Antecedent 2. Affirming Consequent.

(c) *In Disjunctive Syllogism:*

Alternatives { 1. Not mutually exclusive. 2 Not collectively exhaustive.

(d) *In Dilemmas* :

1. Consequent does not follow from its antecedent.
2. Alternatives not exhaustive.
3. Different standards in the two alternatives.

III. In Language :-

1. *Amphiboly* or Ambiguity conveying two meanings.

Eg. The Greeks the Trojans shall conquer

2. *Accent* or Wrong emphasis on words in a sentence.

Eg. Thou shalt not steal thy neighbour's property. •Laying emphasis on different words in this sentense will give different meanings.

IV. Material Fallacies :-

1. *Of Composition* : What is true of a part is taken to be true of the whole.

2. *Of Division*: What is true of wh
taken to be true of each part.

3. *Direct Fallacy of Accident*: What is
generally understood to be true in a special c

4. *Converse Fallacy of Accident*: What i
in a special case is said to be true generally.

5. *Begging the Question* or *Petitio Pri*
Giving the conclusion as the reason.

6. *Non Sequitur*: Giving a conclusion
has no connection with the premises.

7. *Ignoratio Elenchi*: Irrelevant c
sion – Substitutes for conclusion something
looks like it.

V. ARGUMENTUM :-

1. *ad hominem*: Refers to the charac
the man against whom the argument is direc

2. *ad ignorantium*: Plays on the igno
or inability of the opponent to prove the op
conclusion.

3. *ad verecundiam*: Appeals to the a
rity of great names.

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